"Byproduct Coke-Oven Plant, Built at Top of Mine Shaft," see pages 93-98

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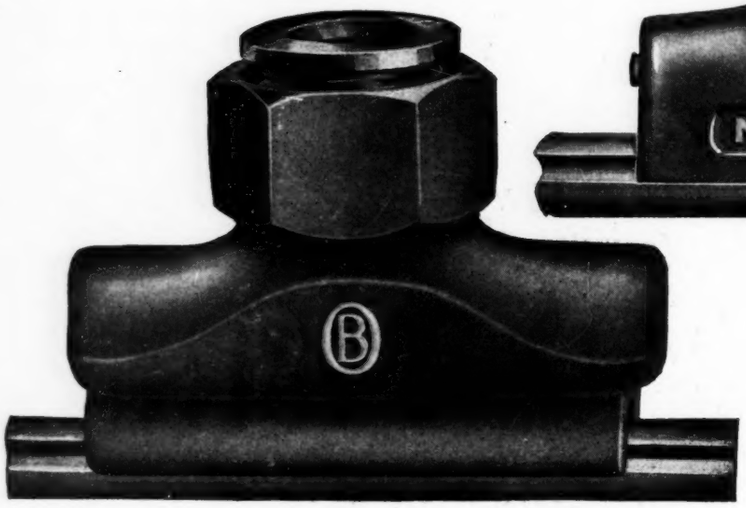

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C. E. LESHER, *Editor*

Volume 24 NEW YORK, JULY 19, 1923 Number 3

Assigned Cars

NOTHING has so disturbed the equanimity of the railroad men and sobered the soft-coal producers as the sweeping decision of the Interstate Commerce Commission in the matter of assigned cars. The operators began their fight against the practice in an organized way in 1918 through the Fuel Administration and later carried it into Congress in an effort to have assigned cars prohibited by the Transportation Act of 1920. The National Coal Association has been a consistent opponent of what it considers a form of special privilege, and after carefully exempting private cars from its attacks, has carried the fight through the several years to a victory in this decision of the commission.

The conclusions of a majority of the commission were unexpected by both sides. On the railroad side it was generally expected that the legality under the Transportation Act of the use of assigned cars would be sustained. So it was, and yet the railroads lost because it was further held that unless the Interstate Commerce Commission specify the occasion, such use of cars is not to be allowed. Which is to say that, having disposed of the case in one way on points of law, the commission turned around and, taking economic jurisdiction, rendered final verdict in another quarter.

The railroads have determined to ask the commission for a rehearing. It does not seem reasonable to expect that they will get concessions, not to mention a reversal, even if they get the rehearing. The Interstate Commerce Commission is concerned, but not overmuch, with precedent, and when a majority of the commissioners say that "The rule evolved in the earlier decisions [Hocking, Traer and Hillsdale] was not the fruition of ripe experience" and proceed to reach a conclusion based on the experience of the six years from 1917 to 1922, in which there was every shade of car supply, one is warranted in inferring that they are not going to change again very soon.

But if the railroads were surprised at the decision as respects the use of assigned system cars, the operators were taken back at the inclusion in the ban of private cars. A number of large, prosperous coal companies are owners of private coal cars. Many consumers, particularly public utilities and steel companies, have their own cars for coal. The investment in such cars, around $30,000,000, has been made because of the advantage that accrues to the ownership during times of car shortage. In previous assaults on the assigned car for railroad fuel, the private car has been exempted. The Fuel Administration and the Railroad Administration did not disturb the customary use of the private car. Thus it has come to be more or less accepted that because the cars are privately owned they are entirely at the disposition of the owner, and that any other disposition would be in violation of the constitutional inhibition against confiscation of private property. Any action that may be taken by private car owners to upset the decision of the Commerce Commission probably will be grounded on that premise.

It must be granted at the outset that had the commission undertaken to differentiate between privately owned and system cars in the matter of assigning to particular use it would have dropped into deep water. The gradation from the cars of a producer of coal through those of an industrial consumer or a public utility to those off an off-line carrier not originating coal is scarcely discernible. And what ground is there for distinguishing between the cars of an off-line carrier set apart for fuel-coal loading and those of an originating carrier when designated for the same purpose? The jurisdiction of the Interstate Commerce Commission over private cars appears to come when these cars enter the service of the carriers and become "instrumentalities of interstate commerce." They are none the less private property on which return is supposed to be made through the charges paid by the roads for their use, as prescribed by the commission. Private-car owners are considering testing the power of the Interstate Commerce Commission over their property as set forth in this decision.

Assigned cars are not abolished forever. However much their use by the railroads may be unreasonable and prejudicial, the Interstate Commerce Commission in the same decision says that hereafter it may in emergencies authorize their use for particular cases. The general tenor of the decision indicates that what is contemplated are service orders giving car preference not only to railroads but to utilities and others in distress. It is quite clearly indicated that the commission has found no substitute for assigned cars and by its promise to care for the needy and negligent in emergencies it has robbed the decision of much of its sting for those who fought to uphold the system. When there is need for fine distinction in the distribution of coal the government will take on the job. But, as Commissioner Hall pointed out in his dissenting opinion, it is rather difficult to understand how a practice that is discriminatory when practiced by the railroads can be otherwise when indulged by the commission.

By this decision the Interstate Commerce Commission has not solved the problem of assigned and private cars, except it listen to its own counsel.

GEORGE CUSHING HAS WRITTEN an analysis and criticism of the anthracite report of the Coal Commission. He finds that the conclusions of that body are all at variance with the facts as found, at odds with decisions of the Supreme Court, that less than satisfactory information was obtained on all major points, that the report presages general regulation of the coal industry, that the report is quite clumsily written and hardly worth anyone's time to read. He also finds that it is hardly understandable; the data confusing. If he can

frame any more adverse criticism he will spill it later. Cushing naturally would take this sort of sweeping position. He would have said the same had the angel Gabriel or George Cushing written the report. No one takes his opinion seriously, least of all Cushing, as he admits in the same article. He says: "From present indications the report of the Coal Commission will make no change in the policy of the coal industry. The bituminous-coal operators' case is still in court. They cannot change policy without doubting the fairness of the commission. *This, they have [despite what I have said] no reason to do.*"

Common Sense versus Cold Law

WHY not settle all these disputes between coal shippers and buyers by common sense instead of by cold law—or chance? Are there not better places than formal courts of law wherein to decide whether certain consignments of coal were up to standard of quality; whether quotations were correct; whether the refusal of coal was right and proper under the contract? At present there is no other recourse in case of dispute than to a court. Yet where breathes the coal producer who has not suffered by miscarriages of justice in cases of suit to collect from shifty buyers? That court sits in the buyer's county. The jury is composed of the buyer's fellow citizens. Where sentiment plays a part the advantage naturally lies with the buyer. Therefore producers, above all others in the coal industry, should be keen for a change that promises to raise the factor of justice in litigation.

Arbitration may do it. Arbitration, properly backed by statute, is getting a thorough trial in industrial disputes. The idea is spreading through the United States. Various industries, thinking of the harassments to the proper conduct of their business relations, are giving the matter serious consideration. The American Wholesale Coal Association has taken the lead in the coal industry. It is time operators also did some serious thinking. They should study arbitration's possibilities. Then, convinced of its merits, as they must be, they should join forces with other business interests to see that necessary supporting legislation is written on the statute books of every state.

There is nothing new about the principle of arbitration. There is nothing new in today's movement to get it generally adopted by industry, as described elsewhere in this issue, except that many a man has a new vision of its value to him. The movement is merely evidence that an old, old idea finally has sunk in far enough to stimulate the motor sense. After all these years of casual talk something actually is being done about arbitration in business. States are passing acts recognizing it as a standard method of meting out justice, and are clothing it with legal authority. In such states—notably New York—clauses are being written into contracts of all sorts in various industries, requiring arbitration of any disputes that may arise. Arbitrators, be they groups chosen by the litigants or boards set up within industries or single "judges" selected by whatever means, are actually settling disputes. The thing is at work.

What is the coal industry going to do about it? Surely it would be of value to producers and sellers of coal to set up within the industry bars of justice where disputes could get speedy attention and speedy settlement, instead of the laggard recognition so often accorded even in the best-organized court of law. Surely it would be good for the coal industry if coal disputes could be settled by men who know coal from A to izzard instead of by a judge who knows cold law and by twelve butchers, bakers and candlestick makers who know when they've had enough. Long-winded harangues and vast bulks of technical testimony by "experts" make any average American jury tired of its job and ready to decide a coal case easily by a flip of a coin.

But arbitration is not something for nothing. It promises to remedy business evils in coal only if the men of the industry are willing to give time and effort to practice it. Somebody has to be the arbitrator. That arbitrator in each case must be a man whose judgment is recognized as sound and whose integrity is above reproach. There are enough such men in the country. They must be ready to serve. Also associations, groups and individuals must support the idea and seriously strive to make the arbitration contract clause universal.

Arbitration must be by methods so eminently sound and the personnel of arbitration boards must be of such high character that any honest and reasonable business man would be glad to subscribe to the clause in a contract when it is presented for his signature. It must not be arbitration by and for the producer as against the jobber, retailer and consumer; nor yet arbitration by and for the jobber as against the rest. There can be no arbitration where there is even a suspicion of prejudice. This thing must be entered upon high-mindedly and with justice as its single purpose. And there is no better time for such an enterprise in coal than now, when the industry is in a state of flux, when coal men would do well to prove that they can settle their own problems, and when, if ever, there is need to display common sense.

TORRENTS OF WORDS often fail where a few accomplish the purpose. A traffic expert said the other day, "I used to hear so many long-winded speeches to the Interstate Commerce Commission and used to see so readily the fatigue they brought the commission that I made up my mind I never would exceed 10 minutes in any such case. It is a good plan. I'm sure I get more results." Why not? Any commission or any individual grasps most easily facts and ideas stripped of all non-essentials. In the coal industry, as everywhere, intelligent brevity is valuable, whether in association reports, convention speeches, presentation of cases or whatnot. Condensing a 100-word idea into 10 words in a speech requires effort. But the idea "gets home" with more force. And Oh! the relief it brings the hearers!

EX-SENATOR WILLIAM M. CALDER admits, in an interview published in the Brooklyn *Eagle* of July 9, that it was through his efforts that the Coal Commission was brought into existence and that its findings, as a result of a most comprehensive study, are substantially in accord with his report on coal to the Senate, except that Mr. Hammond and his associates have made recommendations more drastic than those proposed by the former Senator from New York—and Brooklyn. What Mr. Calder has to say on coal always is entertaining to the coal industry.

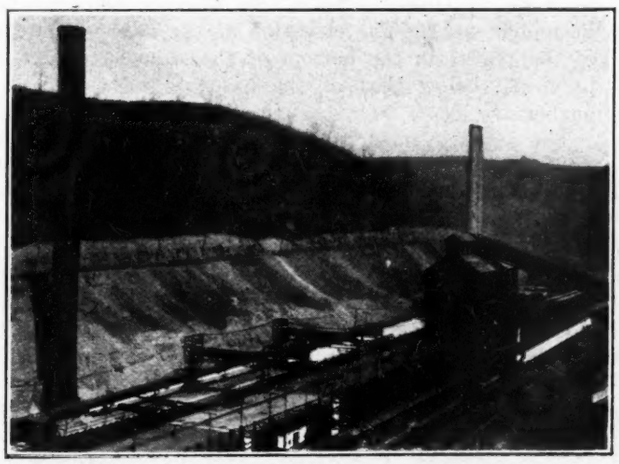
Rosedale Byproduct Coke Ovens And What They Accomplish

Steep Grades and Undermining by Coal Workings Make Oven Construction Expensive—Semet-Solvay Ovens Have Automatic Reversal of Flue Gas—Keeping Carbon Out of Tar—Coal Mixture Used and Byproducts Obtained

By George Atwell Richardson*
Philadelphia, Pa.

THE byproduct coke plants of the Cambria Steel Co. at Johnstown, Pa., form integral parts of two groups, the Rosedale and Franklin units, each comprising: (1) The mines from which the coal is hauled and brought directly into the coal-washer buildings; (2) the coal washer and subsidiary buildings, where the coal is washed and then mixed with coal from other mines to form the proper coking mixture; (3) the byproduct coke-oven plants, where the mixed coals are converted into coke for use in the manufacturing plants of the Cambria Steel Co. and into byproducts which are manufactured mainly for outside consumption.

In previous articles only the first two of the integral parts of the Rosedale plant have been considered because of the newness of the equipment and the nature of the problems encountered. These same parts of the Franklin group are much older and do not have the same interesting features. When it comes to a discussion of the third division it is necessary to describe both plants, for two reasons: (1) Because the byproduct equipment at the Franklin plant is in every way as recent as that at Rosedale, being erected at the same time, and (2) because the plants are different, that at Franklin being equipped for the separation of light oils into their constituents, whereas that at Rosedale is not.

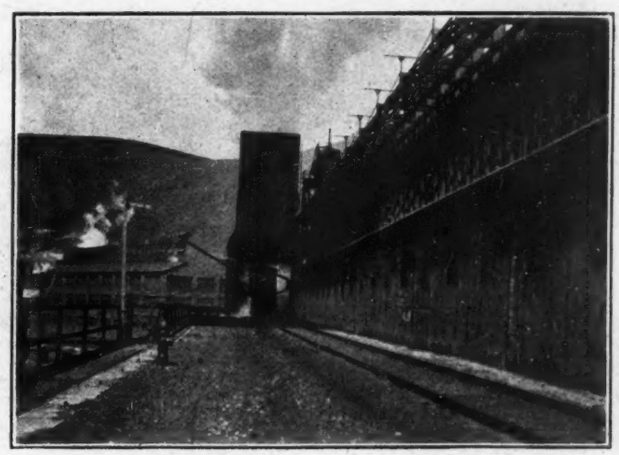


PANORAMA OF COKE OVENS FROM MINE HEADFRAME

In the center is the big coal bin holding 3,000 tons from which the larries are filled for the feeding of the coke ovens. The ovens in the foreground are of the Cambria type. Of these there are 120. In the rearground are the eighty-eight Semet-Solvay ovens with their two brick stacks.

In several ways the Rosedale plant is unusual. At the time of its completion in 1922 it was one of the largest byproduct coke-oven installations ever constructed from the standpoint of actual quantities of materials used. Not only this but the location—on the steep side of a hill and in a deep, narrow valley—introduced engineering problems that would not ordinarily be encountered. These included the furnishing of an adequate and economical supply of coal, the washing and preparation for coking, all described in earlier articles, and more particularly the design and construction of the ovens and byproduct-plant buildings and equipment.

Hinckston Run is the name of a small waterway that flows into the Conemaugh River at a point just below the Cambria plant, west of Johnstown. At its narrowest point the comparatively level ground is less than 200 ft. wide, whereas the side of the hill on which the greater part of the plant was constructed rises sharply. The flow of water is not large, as the stream is im-



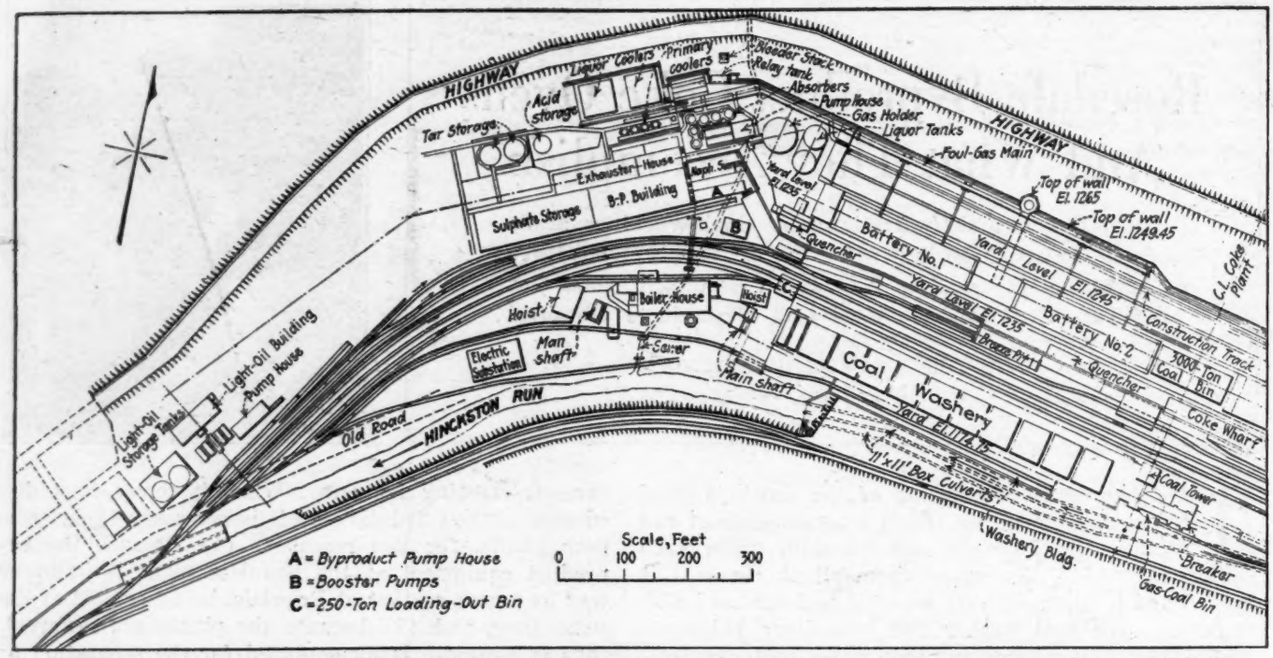
DISCHARGE SIDE OF CAMBRIA COKE OVENS

Coke is being quenched at the west tower. Note how the locomotive obtains its power and the provision made for the return circuit. The structure to the left and in the rear is the byproduct building.

*Midvale Steel & Ordnance Co. and Cambria Steel Co. Since this article was received these two companies have merged with the Bethlehem Steel Co.

NOTE—This article is the fourth in a series of six describing an unusually interesting combination of modern mining methods and byproduct-plant practice. The three which have already appeared, are entitled "Cambria Steel Co. Drops Coal Down Well, Loads it at Bottom and Hauls it to Ovens," "Haulage, Hoisting and Dumping Practices at Rosedale Mines" and "Rosedale Uses Bumping Tables to Wash Its Product, Mixing It for Coking Purposes with Gas Coal." They are to be found in the issues of *Coal Age* for Aug. 31, Sept. 7, 1922, and Feb. 15, 1923, respectively.

The headpiece shows the coke leaving an oven and falling red-hot into the quenching car which, containing a little water from previous quenching, is sending up a cloud of steam in which is entrained much smoke. A latticed guard keeps the coke mass intact till it reaches the edge of the wharf.



WESTERN HALF, ROSEDALE BYPRODUCT PLANT; RECOVERY EQUIPMENT PROPER ON LEFT, OVENS ON RIGHT

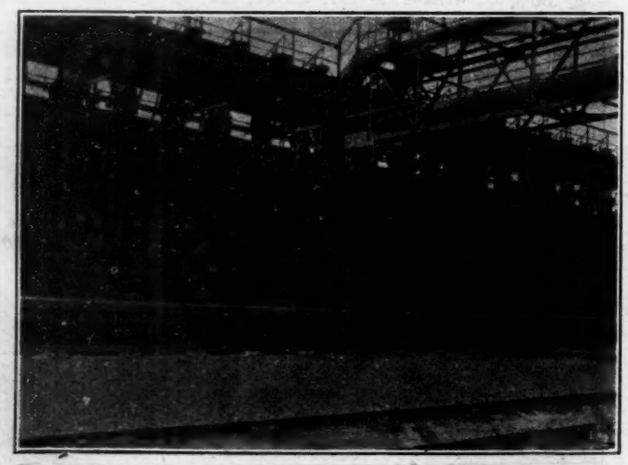
A culvert, consisting in its upper part of a 16-ft. arched waterway and in the lower end of two waterways 11 ft. square set side by side, takes the water of Hinckston Run past the coke yards, making it possible to use the full width of the valley. It has a good gradient of 1.07 per cent. The end of this culvert can be seen near the coal washery, gas-coal bin and breaker. In order to reduce excavation costs the buildings and ovens are set at different levels; thus the level of the yard below the washery building is 1,174.5 ft. and that between the draining pits and the wharf wall is on a 1.58-per cent gradient and varies in elevation from 1,192 to 1,208 ft. The wharf wall itself is at an elevation of 1,235 ft. and the coke-pusher track yard is at an elevation of 1,245 ft. Despite this the pusher track has to be protected by a retaining wall in some places reaching an elevation of 1,260 ft., though in other places it is only 1,246 ft. above datum. A new highway had to be built around the plant at a still higher level.

pounded farther up and as the reservoir forms part of the water supply used by the Cambria Steel Co. for manufacturing purposes.

One of the first problems that presented itself was that of providing suitable working space in the middle of the valley, and this was accomplished by the construction of a 16-ft. concrete arch culvert about 1,300 ft. long which, traversing the entire length of the plant, carries past the ovens the water it receives from the stream.

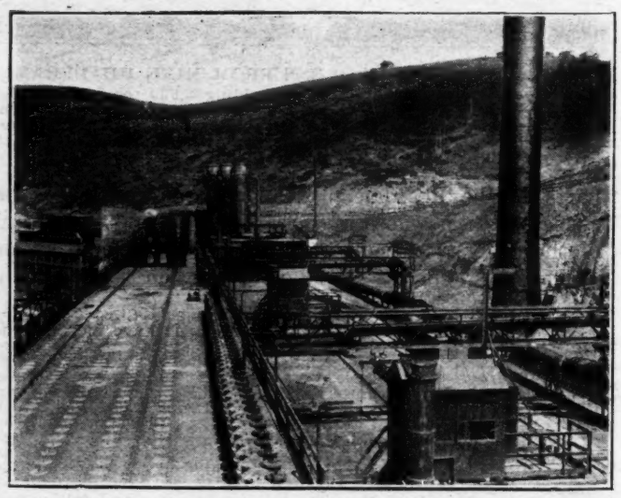
The plant itself was constructed in three levels. The coal washery and other coal-handling equipment were erected in the bottom of the valley. On the second or middle level were placed the various byproduct buildings and equipment pertaining thereto, the ovens being built on the upper level. The average slope of the ground is 1½:1. The elevation of the base of the rail of the tracks in the bottom of the valley averages 40 to 45 ft. below that of the base of the rail of the pusher tracks.

The actual construction was carried on under great difficulties. Unexpected troubles were encountered in laying the foundations of the ovens. The material near the surface was of such a treacherous nature that it became necessary to sink the 156 caissons to solid rock. Each caisson was 6 ft. in diameter. Their average depth was 36 ft. In several instances in sinking the caissons abandoned mine galleries were entered which lay about 40 ft. below the ground, these sometimes being filled with water, which added to the difficulties. Re-



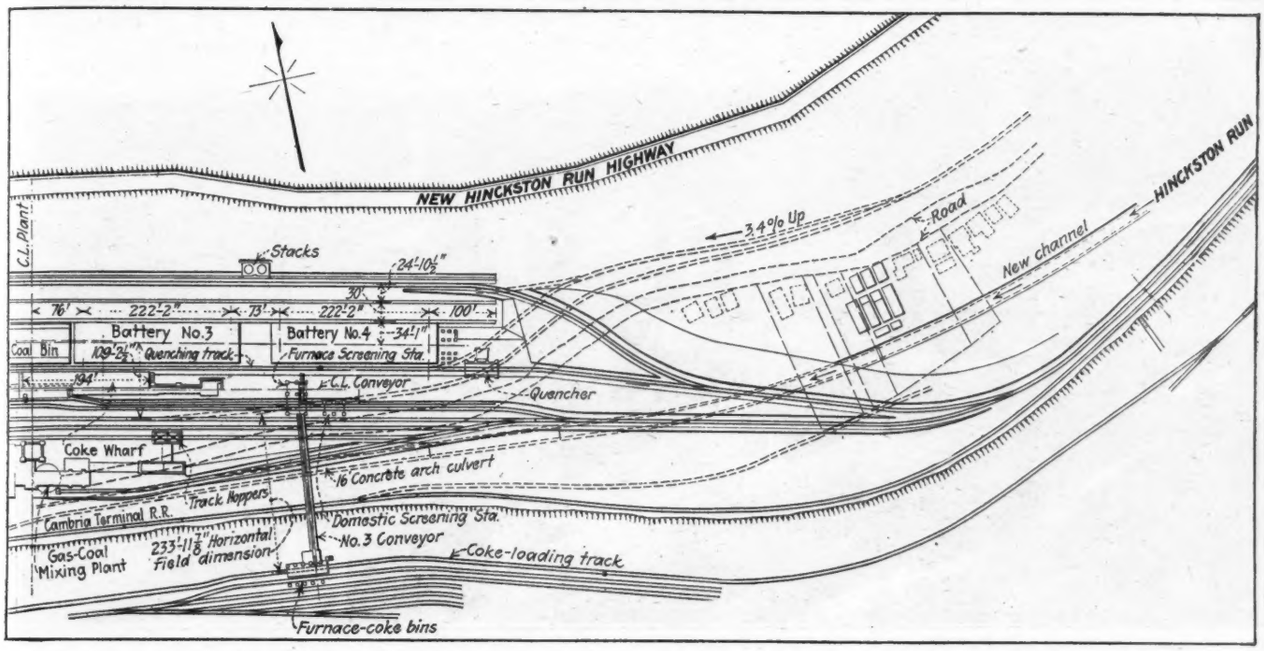
SEMET-SOLVAY OVENS SEEN FROM PUSHER SIDE

This shows one of the bridges or gantries carrying the suction main for gas and the hydraulic main which runs along the top of the ovens and collects the gases from which byproducts are obtained. Note the wide track on which the pusher runs. This is the narrow end of the ovens, the width increasing slightly toward the discharge side to facilitate the removal of the coke.



CAMBRIA-TYPE OF OVENS SEEN FROM ABOVE

On the left can be seen the rails for the coal larry and the five rows of ports by means of which the ovens are filled. On the right are the bridges by which the liquid and gaseous byproducts are conveyed to the suction or foul-gas main.



EASTERN HALF, ROSEDALE BYPRODUCT PLANT; SHOWING SEMET-SOLVAY OVENS AND COKE-HANDLING PLANT

In this plan nothing can be seen of the Cambria ovens, which lie on the far side of the big coal bin by which they and the Rosedale ovens are supplied with coal. The fill leading from the south side of the valley to the north is 35 ft. deep where it crosses the new subterrannean channel made for Hinckston Run and 38 ft. deep where it crosses the front line of the ovens, the gradient being 2.60 per cent in the northerly direction. All the slopes are made 1½ to 1. Many difficulties had to be overcome in the building of the plant. Owing to the treacherous nature of the soil it was necessary to sink caissons 40 ft. to solid rock. In some cases abandoned mine galleries, found full of water, added to the difficulties. Reinforced-concrete beams 6 ft. square were placed on the pillars thus erected, and these in turn were covered with a concrete slab 3 ft. thick and it was on these that the regular oven foundations were laid. The plans here published were slightly modified before construction was completed.

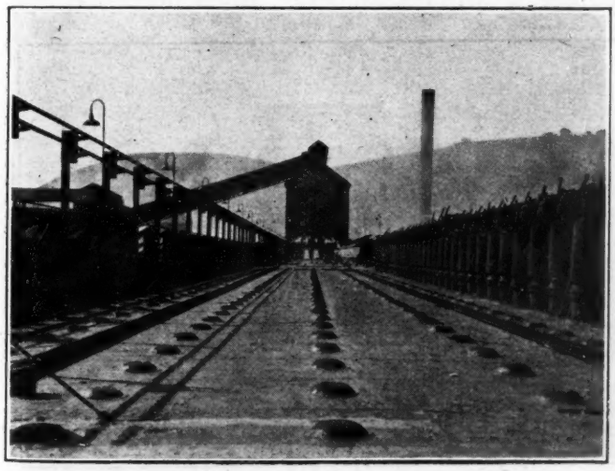
inforced-concrete beams 6 ft. square surmount the pedestals thus formed and these in turn are overlaid with a concrete slab 3 ft. thick upon which the ordinary oven foundations are placed. In this way all danger of settling or slippage of the ovens has been effectually eliminated.

Soil slides were another source of trouble. These had to be overcome by the construction of heavy retaining walls. In carrying out all this work more than 150,000 cu.yd. of excavation and 50,000 cu.yd. of backfilling were necessary. As the retaining walls were 2,000 ft. long they served with the foundation work to bring the quantity of concrete poured to 70,000 cu.yd.

Material handling, not only at this plant but also at Franklin, was complicated by the lack of level ground. As a result a storage plant was erected about a mile and a half from Rosedale at a place known as "Ten Acre." Here more than 70,000 sq.ft. of covered storage space was provided, this including machine shops and equipment for doing a large part of the work of assembling. All material for the Rosedale and Franklin plants was handled at this place and aggregated more than 1,000 carloads.

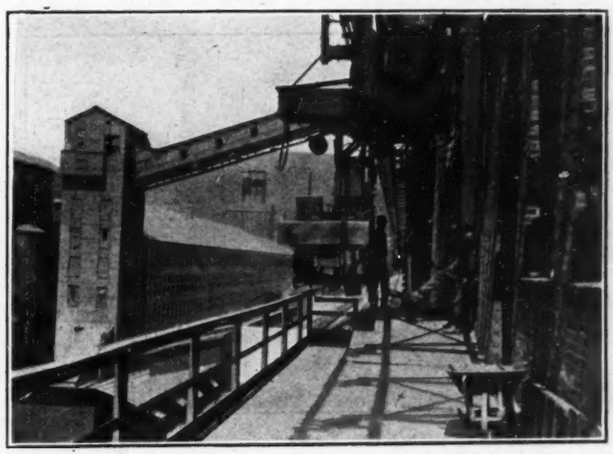
Despite these initial difficulties the proximity of an almost unlimited coal supply and the possibility in any cases of substituting gravity flow for pumping, as well as other conditions, made the proposition an advantageous one. With this background, the plant itself will now be illustrated and described in detail.

Part of the coal for cooking is hoisted directly from the mines and dumped in the coal-washer building. The local coal is low in volatile constitutents and non-



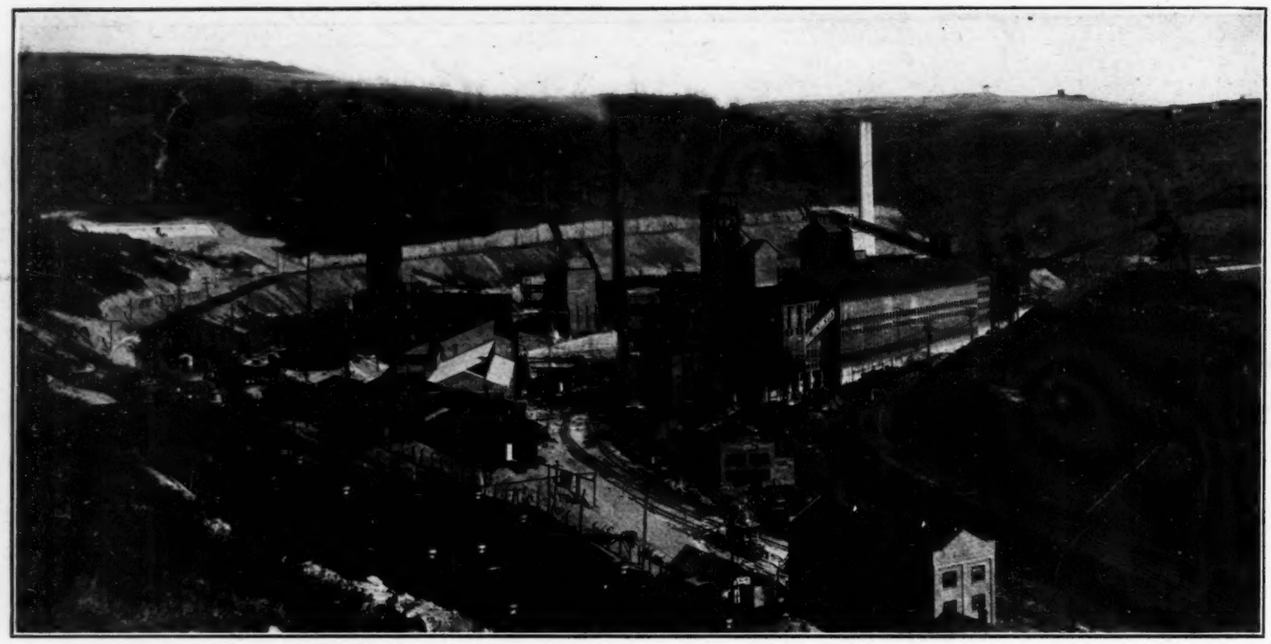
TOP OF SEMET-SOLVAY TYPE OF OVENS

Here the ports for filling the ovens are more plainly visible than in the illustration of the top of the Cambria-type of ovens. The pipes on the right carry the byproducts to the collecting hydraulic main. The view is taken looking west toward the coal bunkers.



MECHANISM FOR REMOVING DOORS ON DISCHARGE SIDE

This shows the equipment used at the Solvay ovens for placing and displacing doors. The building on the left houses the drier and washery and in the tower at the rear end of the building the mixed coal is elevated for transportation, by the conveyor bridge shown, to the coal bin in the center of the ovens.



ROSEDALE BYPRODUCT-OVENS AND REFINING PLANT ON HINCKSTON RUN NEAR JOHNSTOWN, PA.

Only terracing made the irregular site feasible for so large a project. The 175-ft. headframe can be seen to the right of the center stack. Next to it is the coal washery where the Rosedale coal is washed and mixed with high-volatile coal. Closer in the foreground may be seen the refining plant in which the more important byproducts are prepared for market. The light oil is condensed but goes to the Franklin plant for final refinement. Furthermore, ammonia is not made at Rosedale as a merchantable product. All the ammonia obtained is used to make ammonium sulphate. the sheds in foreground are part of the construction equipment. Work was not entirely completed at the time this picture was taken, nor were all work sheds removed.

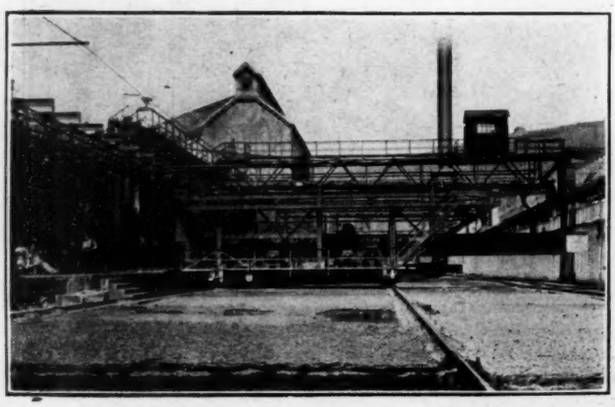
coking and must be mixed with gas or high volatile coal to produce a suitable coking mixture. For this reason, after washing, the local coal is mixed with gas coal brought from other of the company's mines and is then taken by belt conveyors to the coal bunkers over the ovens.

The Rosedale ovens, 208 in number, are contained in four blocks or batteries. Batteries Nos. 1 and 2 each contain sixty ovens of the Cambria type. Batteries Nos. 3 and 4 each with forty-four ovens are of the Semet-Solvay type. The bunker or coal-bin building, where 3,000 tons of coal can be stored, straddles the ovens at a point between batteries Nos. 2 and 3, and the larries that charge the ovens are themselves charged by gravity.

The Cambria and the Semet-Solvay types of ovens thus combined in a single plant have many points of difference. The Cambria oven takes a charge of 10.5 gross tons whereas the charge of the Semet-Solvay oven will average 15.5 tons. The coking time also is longer, in the first case averaging about 24 hours as compared with 15 to 16 hours in the second. If necessary, however, the pushing could be done every 20 hours in the first case. When running at maximum capacity the ovens as a whole therefore may be estimated to coke about 3,500 gross tons of coal per day.

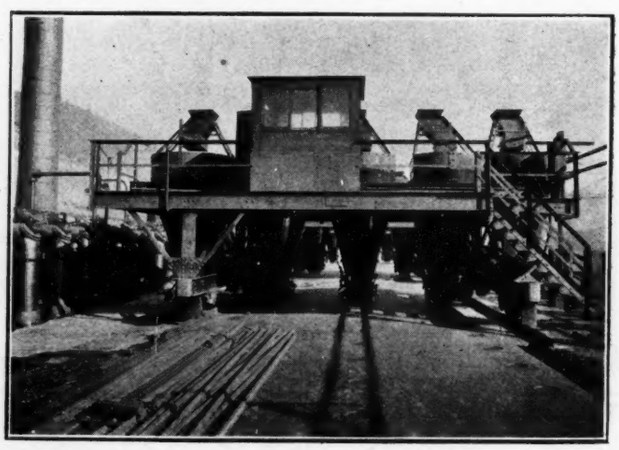
Both types of ovens are of the modern regenerator type, but the method of burning the gas used for heating varies considerably. In the Solvay ovens there are five gas inlets or ports, two on the pusher side and three on the coke side, which admit the gas to various parts of the flue. In the Cambria ovens the gas is mixed with the air and ignited underneath the ovens and the resulting flame then passes up through the flues.

Two electrically operated charging larries are used in charging the various blocks. All the ovens have five



COKE PUSHER AT SEMET-SOLVAY OVENS

A wide area has to be provided for a coke pusher, for when not pushing the ram stands out well behind the extremely wide-gage truck on which it is carried. The power of these rams obviously must be great to accord with the great depth of the coke in the oven. In this instance a big retaining wall had to be erected back of the area allotted to the pusher track and the ram clearance.



LARRIES WITH SPOUTED HOPPERS ON CAMBRIA OVENS

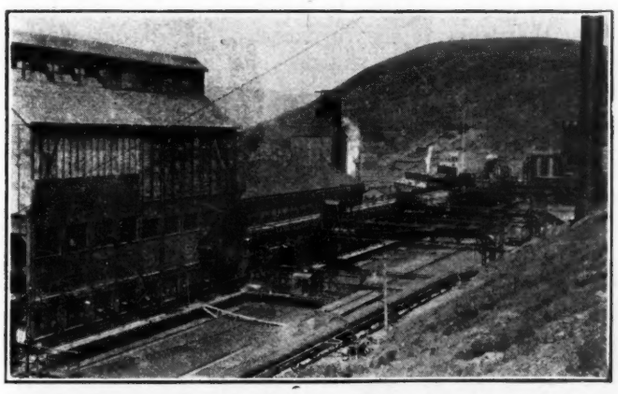
Three larries are shown here drawn up, one behind the other. Each hopper is provided with the proper quantity of coal to fill its section of the oven without waste and without deficiency—an important item in economical operation.

holes in the top for charging, there being spouts on the larries for each opening. The doors of the ovens are sealed with mud which is ground and mixed in the coal-bunker building.

The flow of air is automatically controlled in the Solvay batteries. Induced draft is used and the damper which regulates the flow is equipped with red- and green-light signals. The governor consists of a spring set against a float at given pressure. Electrical contacts are established by means of which the controls are regulated. The direction of the flue gases is automatically reversed at 15 minute intervals, a bell ringing to show that it has taken place. The Cambria batteries are manually, not automatically, controlled.

There is some question as to the real value of automatic control. Some feel that it is unnecessary, as a watch must be kept to see that the change in direction takes place with the desired frequency. It is argued that the very fact that the action is automatic leads to carelessness, which might have serious results should anything go wrong with the apparatus. The other, and what in my opinion appears to be the more logical, viewpoint is that automatic control is desirable if for no other reason than that it insures regular and uniform operation.

The following data are continuously recorded: (1) the gas pressure on (a) the coke side and (b) the pusher side of the ovens; (2) the reversing time; (3) the stack draft on (a) the coke side and (b) pusher side of ovens. In addition ordinary tube pressure gages indicate the gas pressure and ordinary inclined-tube



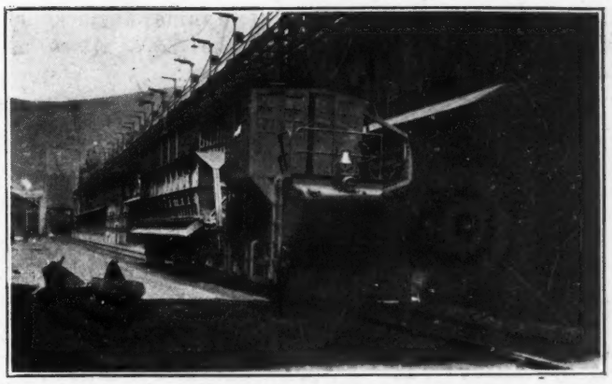
COAL BUNKERS AND PUSHER SIDE, CAMBRIA OVENS

In the foreground is the foul-gas main and in the rear the washery and the Rosedale shaft headframe. The coal bunkers are large enough to hold 3,000 tons of coal.

draft gages the stack draft. A Venturi meter measures the flow of gases. Each battery of Solvay ovens is entirely independent and has separate dampers, reversal mechanism, stacks, etc.

In charging the Semet-Solvay ovens it is customary to leave the damper open in the outlet which leads from the oven to the foul-gas main. This not only protects the men but serves to prevent carbon from getting into the tar. Practice of this kind is largely a matter of convenience and in some sections is not allowed on account of the smoke. The Cambria ovens are not provided with these dampers, one damper in the foul-gas main of those ovens controlling the entire battery. The dampers in the Semet-Solvay units also serve to regulate the back pressure if the suction fails.

For economical operation it is important that the ovens be charged with the correct quantity of coal. If the charge is made too small the oven space is not being



ELECTRIC LOCOMOTIVE WITH COKE-QUENCHER CAR

The coke ovens are pushed one by one and the hot coke loaded into the quencher car, taken to the quencher tower, shown in the rear, drenched with a measured quantity of water and then dumped as shown in Fig. 12.

used economically. On the other hand coal is wasted when the ovens are charged with an excess of coal, for the leveler pushes it out of the oven. Sometimes this wasted coal is put back on the next charge, but it is better to throw it away as it burns up and so is wasted regardless of the effort expended.

It has been stated already that the coal mined in the locality of Johnstown has to be mixed with other coal and it will be of interest to note the general composition and possibilities of the various kinds of coal now being used.

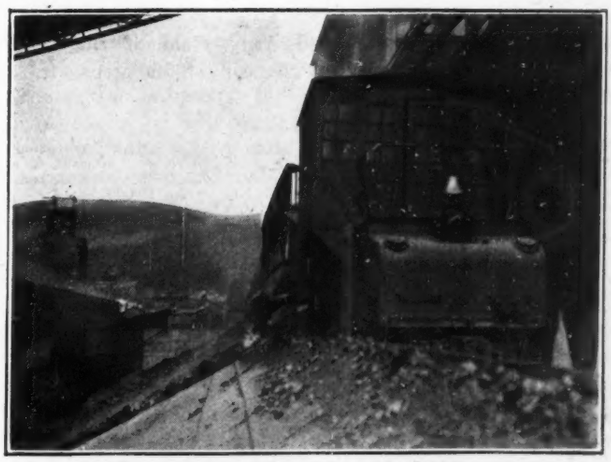
Local coal is low in volatile matter and analyzes roughly as follows when washed and later dried at 105 deg. C.:

Constituents	Percentage
Volatile matter	18.99
Fixed carbon	72.79
Ash	8.22
	100.00
Sulphur	1.51

This coal not only gives a small yield of byproducts but is likely to break down the oven walls owing to the excessive expansion that occurs when the coking process produces too small a quantity of gas. Leaving this danger out of consideration, the average yield per net ton would run about as follows:

Tar	4 gal.	Sulphate of Ammonia	17.1 lb.
Gas	10,050 cu.ft.	Coke	84.2 per cent
Light oil	2.3 gal.		

The light oil is estimated to contain 55 per cent of benzene and 12 per cent of toluene.



DUMPING A LOAD OF COKE FROM QUENCHER CAR

The coke is still too warm to handle, so it is allowed to fall on a steel slope set at about the angle of rest of coke. As it is conveyed away other coke slides down and is carried away in its turn. The action is almost automatic but sometimes a man with a light tool has to push the coke down the slope.

Coals from the Cambria Steel Co.'s mines at Slickville and from the Union Coal & Coke Co.'s mines at Marianna and Acme analyze as follows:

Constituents	Slickville Mines Percentage	Marianna and Acme Mines Percentage
Volatile matter	33.08	34.60
Fixed carbon	57.11	58.46
Ash	9.81	6.94
	100.00	100.00
Sulphur	1.42	1.15

The practical yield per net ton of these would be:

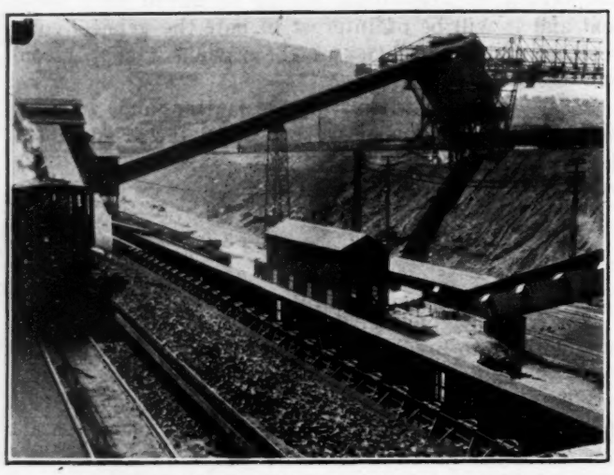
Byproducts	Slickville Mines Quantity	Marianna and Acme Mines Quantity
Tar	9.3 gal.	10.1 gal.
Sulphate of ammonia	24.5 lb.	25.7 lb.
Gas	10,500 cu. ft.	10,600 cu.ft.
Coke	70.4 per cent	70.0 per cent
Light oil	4.1 gal.	4.2 gal.

The light oil in each case is estimated to contain 50 per cent benzene and 15 per cent toluene.

The usual mix runs about 60 per cent low-volatile and 40 per cent high-volatile coal which will yield *per net ton:*

Tar	7.5 gal.	Coke	70 per cent of coal
Sulphate	24 lb.	Weak liquor	30 gal.
Gas	10,500 cu.ft.	Light oil	3 gal.

The mix is varied, however, to meet conditions and the coal available. The foregoing yields, as noted, are



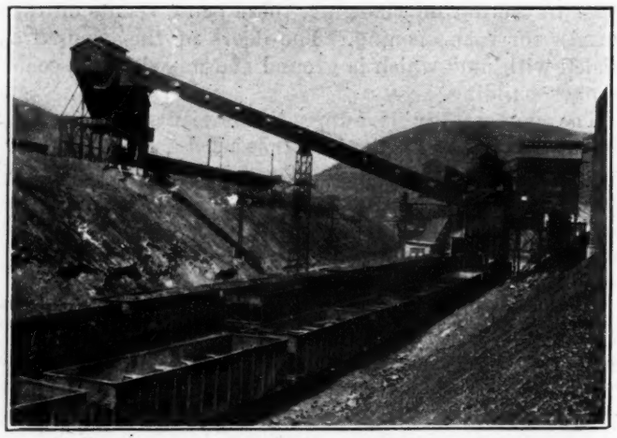
COKE WHARF LOOKING TOWARD THE EAST

Here the wharf, which is 200 ft. long, is filled almost full of coke. In the rear can be seen the building to which the coke is carried by the conveyor for screening and crushing. Here coke passing over a 4-in. grizzly is crushed to smaller and more suitable sizes.

per net ton. The estimated daily yield of the four batteries of ovens based on charging 3,500 gross tons per day gives the following:

Furnace coke	2,695 gross tons
Domestic coke	40 gross tons
Breeze	65 gross tons
Sulphate ammonia	104,000 lb.
Light oil	12,000 gal.
Tar	32,000 gal.
Surplus gas	25,000,000 cu.ft.

For handling the coke, quenching cars 40 ft. long are provided, each of which is attached to a 27-ton electric locomotive. After the coke has been pushed from the ovens into the cars it is taken to one of two quenching towers (there is one at each end of the entire layout) where it is quenched with water for about 40 seconds. The breeze, which goes with the water through the bottom of the car, amounts to about 1.4 per cent of the weight of the coke quenched. It is collected and sent to the dump, as it cannot be used. The water from the quenching towers drains down into a sump and is circulated over and over with the same pump, the necessary additions being made to take care of water lost in the quenching operation.



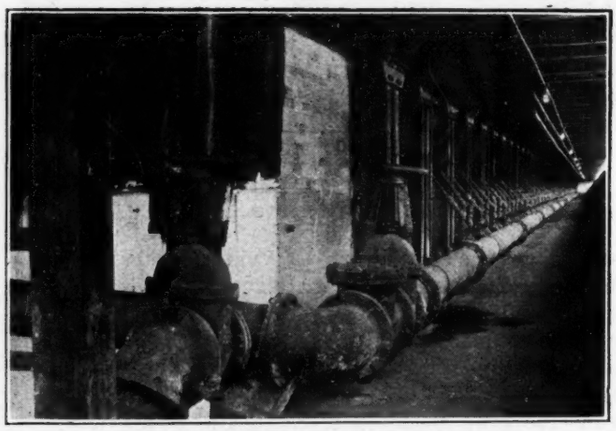
COKE CONVEYOR BELTWAY AND CRUSHER BUILDING

All the coke that will pass over a grizzly with ¾-in. spaces is taken by a 250-ft. belt conveyor to the furnace loading station, where a shuttle conveyor distributes it into a 250-ton bin. Coke between ¾ in. and ½ in. is loaded out for domestic use. The breeze is used at the boiler house of the plant.

After quenching the coke is brought back to a 200-ft. inclined coke wharf where it is dumped. Long-toothed gates control its admission to a 42-in. conveyor belt which takes it to the screening station.

There the coke passes over a rotary grizzly screen with 4-in. spaces. The oversize coke is then crushed, and all the material is then conveyed by a belt to a second grizzly having ¾-in. spaces. The coke that passes over this grizzly is taken by a belt conveyor 250 ft. long across the valley to the furnace loading station, where it is distributed by a shuttle conveyor into a 250-ton inclined bin specially designed for the loading of the coke into cars without breakage.

The undersize coke which passes through the grizzly is conveyed to a shaking screen of the standard type where all that is over ½-in. in size is separated out for domestic use. The breeze is loaded into cars and used



GALLERY UNDER SEMET-SOLVAY TYPE OF OVENS

This illustration shows the fuel-gas main and burner pipes. The view is taken on the pusher side of the ovens and looking west. The explosion and control valves are shown in the foreground.

at the plant boiler house. A crusher also is provided which can be used to crush the ½-in. size still smaller when there is no demand for the larger coke in the domestic market.

IF FRANCE WILL ONLY WAIT a little while the German offers will be offers to accept an indemnity.—New York *Tribune.*

Welding and Brazing Practices That Make Repairs Easy

Building the Fire—Repairing a Broken Machine Casting—Good Job Gives Part 80% Per Cent of Its Original Strength—Preparing the Work—Various Kinds of Fluxes—Causes of Poor Weld

BY GUSTAV RADEBAUGH
University of Illinois, Urbana, Ill.

ONE of the most important essentials in all forge work is a good fire. Many failures of brazing and welding are caused not by the kind of material used, as is commonly supposed, but by poor heating in a poor fire. Although not generally appreciated, mostly all the brazing and welding difficulties that a beginner encounters are in the fire. The usual blacksmith fire is called an open fire, and it is used for general forging work.

As noted in the operations, care must be exercised in building a good clean fire. The only way this can be accomplished is by removing all the old dead material and sorting all coke from the fire before discarding. Always save the coke, as no better material can be obtained for use in a forge fire. The smith is sometimes wasteful with coke and it is discarded with the ashes, but every little piece should be saved. Clean coke is by many considered preferable to charcoal for brazing, because it makes a more even fire.

Coal that will coke must be the best grade of soft or bituminous coal. Good blacksmith coal will coke easily and also is free from sulphur. If much sulphur exists in the coal, it will make welding and brazing a difficult operation. A good method to test coal for forge use is to break a lump. If it breaks easily, crumbling into small grains, and the newly fractured faces show up bright, it is in all probability good firing coal. The coal should crumble rather than split up into layers. Soft coal used for home firing is not good for forge use, as it makes a dirty fire. A few bushels of regular blacksmith coal will last a long time.

In some brazing jobs a heavy scale may rise on the work when heating. This scale is called oxide and is caused by air coming in contact with the job while heating. To prevent this, use a good thick fire—that is, have an abundance of firing material between the tuyere and the work.

The preparing of the fire bed is important. For the average fire for shop jobs a block 3½x3½ in. can be used. This block is placed over the tuyere, as shown in Fig. 1. The blacksmith coal is then dampened down—this is called green coal. The green coal is now placed around the fire block as snugly as possible. After this is done the block is removed. This hole keeps the fire together and holds in the heat.

The fire is now ready to be started. Use shavings or oily rags. After lighting, as shown in Fig. 2, place them in the bottom of the fire hole and turn fan very slowly; this is necessary to prevent the firing material from going out. Break some of the pieces of coke that were placed to the rear of the hearth into small pieces. Place a few shovelfuls on the newly lighted fire. Increase the air blast just a little after the coke has been placed. After the firing material has burned for a few minutes the fire hole will become hollow. The coke is pushed into the hole by using the rake, as shown in Fig. 3.

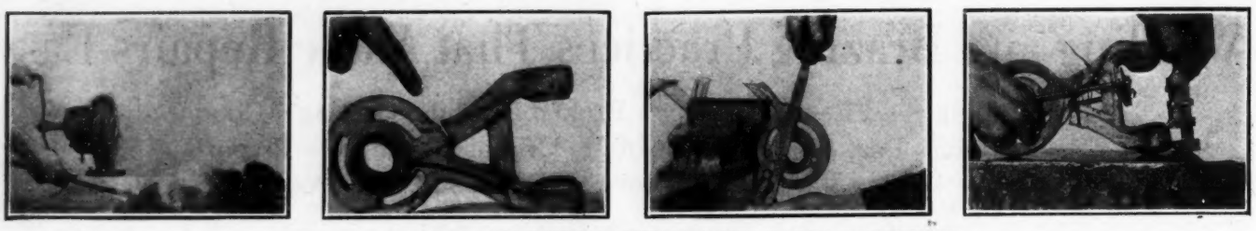
When the coke is burning freely, Fig. 4, it is good practice to mound up the fire a little with more coke before using the green coal. The green coal is now placed on each side of the fire and it is gradually worked into the fire. When it is desired to hold a fire for a short period this is done by raking coke into a mound over the fire. It is then covered with green coal. A good method to hold a fire for a long period is by thrusting a piece of hardwood down the center of the fire before banking it.

When the fire burns freely it is ready to use. A fire that is ready to receive the stock to be heated should not be giving off much smoke. In heating a job for brazing, too much blast should not be used, as the coal requires a certain amount of air to burn thoroughly. If too much air is used the oxygen is not all burned out and this passes through and strikes the heated job, forming an oxide or scale.

The repairing or replacing of broken castings on mine machinery sometimes leads to long and costly delays. The standardizing of mine equipment, however, has made it possible to obtain repair parts without lengthy delays. But many times a repair is needed at once and even the time required to go to the commercial repair shop would be a costly delay. The kind of material in the broken piece determines nearly in all cases the method of repair. If a steel strap, bolt, rod, or steel connection is broken, it is common knowledge among all that it can be welded, or replacement can be made usually from the mine's own repair shop. But in repairing a broken casting a somewhat different problem enters into the repair job.

We find that the components of mine machinery are

FIGS. 1, 2, 3 AND 4—PREPARATION OF THE FIRE IS HIGHLY NECESSARY IN WELDING AND BRAZING
Heat control is more easily accomplished and impurities in the coal prevented from entering the weld when the fire is properly built. Packing of the fuel in a form which will accommodate the material to be repaired will greatly facilitate the work.



FIGS. 5, 6, 7 AND 8—MATCHING THE BROKEN PARTS TOGETHER

After the broken casting has been cleaned of all dirt and grease it should be filed and fitted so that all parts will be properly aligned when the work is completed. Clamping and binding the casting insures a good job in the minimum amount of time. Extra handling of the specimen while hot is undesirable and is rarely necessary if the alignment of parts is properly made and maintained by sufficient clamps. The casting should not be removed from the fire while turning it over.

made from malleable iron, cast gray iron, and steel castings. In the repairing of these castings there are several channels open for determining the best methods. The casting can be patched—that is, a steel strip or sheet can be placed on the piece with bolts or rivets. Sometimes it is necessary to forge or form the steel patch so that it will fit the shape of the casting. In malleable and steel castings, if their design permits the placing of such a patch, considerable time can be spent on the repair, as it probably would be impossible to get a new casting made in a local foundry. In cast-iron repairing, however, it is sometimes advisable to have a new casting made, as the new part would be cheaper than a repair job. Foundries that cast gray iron are found in nearly all of our larger trading centers. The broken casting can, as a rule, be used for the pattern for making the casting. If a new pattern is required, the cost would be high and it would not be advisable unless all other channels of repair had been investigated and this method found to be the only solution of the problem.

Several Methods for Repairing

Another method that is being used successfully, especially when the mechanic doing the job understands the operation, is repairing the broken components by using the oxyacetylene process. In this method a welding flame which has an intensely high temperature—6,300 deg. F. maximum—is obtained by the combustion of acetylene and oxygen. The broken pieces are fused together when at a melting temperature.

The brazing method of repairing broken castings has not been fully appreciated by the repair man as a method of repairing that he may employ. In using this method there is no reason why even the inexperienced man cannot familiarize himself with the process and perform the operation, with a little practice, the same as a repair man in the commercial shop. In brazing, the only supplies needed are the brazing smelter or solder and flux. One good flux is the household powdered borax. The tools required are the file, hammer, pliers, wrench, forging tongs and a forge. With these few tools a good job of brazing can be done on any of the three castings named.

The brazing smelter consists of 50 per cent copper and zinc. This percentage may be changed somewhat by makers of the smelter, but a mixture of about this proportion generally is used. This is cast into ignots and granulated into grades known as long, short, and fine. The short grade usually is used for broken casting repair work. This smelter can be purchased through any local implement dealer or general supply house.

In brazing cast-iron castings, in case the borax flux does not give results, a flux of the following formula can be used: boric acid, 16 oz.; chloride of potash (pulverized), 4 oz.; carbonate of iron, 3 oz. This mixture should be kept in a good tight jar, as moisture or long exposure to the air lessens its effectiveness. This preparation is added to the smelter just before applying it to the casting.

In brazing, all grease and dirt must be removed from the casting. This can be done by heating the casting to a dull red heat and then using a wire brush or old file to remove any particles left on the casting. The casting is then permitted to cool. The broken edges of the parts are filed and are then clamped together by using baling wire strap clamps and bolts. Sometimes a job is of such design that it can be bolted together. After the parts are joined with this clamping arrangement, the job is placed in the forge fire, which should be well coked and with a fairly deep bed. It is heated slowly until it gets to a bright yellow color. The flux is then applied separately or jointly with the smelter. This smelter and flux can be placed on the job with a rod which is flattened at the end. When brazing cast iron let it cool slowly, as sudden chilling may cause check cracks. It is estimated that if a good job of brazing is done on a casting it has within 80 per cent of its original strength.

In preparing a broken casting for brazing, Fig. 6, the casting must be thoroughly cleaned, placed in the forge fire, and heated to a dull red heat. It is then taken from the fire and the dirt and scale are easily removed with a wire brush or an old file. The edge of the casting should be beveled as shown in this view. This is done to permit easy flow of the smelter when the brazing operation is being performed.

The broken casting in position to be clamped together as shown in Fig. 7 should be fitted together and the clamping arrangement decided upon that will hold the casting in a positive position. The alignment of holes must receive careful attention when clamping, for if the holes are out of alignment there is possibility of trouble after the brazing is completed. Some mechanics have found that by placing the flux on the cracked surfaces of the job before placing them together causes the smelter to flow freely.

The clamping or fastening may be done by using screws, wires, bolts, or clamps, as shown in Fig. 8. If it is at all possible, the pieces should be held in such a way that the job can be turned over during the brazing operation without changing the alignment. This is essential in order that the brazing flux and the smelter can be placed on all sides of the casting.

A good job of brazing cannot be done unless the pieces have been securely clamped together. It pays to spend considerable time on this operation, because discouraging conditions will be encountered when the job is in the fire if the pieces are not firmly held together. Malleable castings, gray-iron castings, and steel castings can be brazed. The same brazing methods and materials are used on these castings.

After the pieces have been clamped, as shown in the preceding operation, a fire is built in the forge as already described. Heat slowly until the casting is a bright yellow. With a flattened steel rod, as shown in Fig. 9, apply the flux and smelter. This must be done while the heat is maintained at the bright yellow temperature. This smelter should run freely at this temperature. Do not remove the casting from the fire when turning it over. When you are satisfied that the smelter has flown into the break, the casting is then permitted to cool. When brazing a gray-iron casting it is good practice to permit the casting to cool with the forge fire. This will prevent check cracks.

The job is now removed from the cooled fire, and if still hot it is placed in ashes. This, of course, is not necessary unless it is thought that the casting will crack by contraction strains coming on the weaker parts of the casting. After the job has cooled so that it can be handled, the braze seam, Fig. 10, can be cleaned up with a file. The casting is now ready to place in service.

Three important essentials govern the welding of iron and steel: (a) The kind of fire; (b) shape of end prior to making weld; (c) kind of fluxes used. All of these are so important that if difficulties are encountered when welding, investigate the job for improper practice related to any of these essentials and no doubt your obstacle can be overcome.

Coke, coal and charcoal are used in a forge for heating steel or iron for welding. Bituminous coal low in sulphur is the most common fuel used. In preparing the fire for welding see to it that the fuel is free from lead, bronze or brass that may have become mixed in the fuel from previous brazing or babbitting operations. Do not try to weld with a "green" fire; see to it that the coal is well coked. The fire used for welding should have a thick bed between the tuyeres and the work. The necessity for this precaution is to hold to a minimum the amount of air that strikes the steel when being heated.

There are five common methods of forming the ends of stock prior to making a weld. They are classified as follows: Scarf weld, butt weld, lap weld, cleft or split weld, and jump weld. Reference to Fig. 11 shows the form of these different welds. In all of these but the lap weld the surface of the laps are crowned. This is very important. If brought together when hot the ends stick in the center, and upon being forged together all the slag and dirt sticking to the metal is forced from the center outward, leaving the hot metal free from any oxide of iron. In making the lap weld the hammering should begin in the center, as this has a tendency to work all the slag free from the welding surface. It is understood that a defective weld will be caused if the job is not entirely free from this scale.

Fluxes are used in welding for two purposes. Oxidation of scale formation is prevented by the flux melting and covering the heated surface, and it also aids in dissolving any oxide that may have formed. Wrought iron, unless it is very thin, can be welded without flux, because it can be heated to such a high temperature that the oxide is melted. When welding machine steel or tool steel it is necessary to use fluxes. Sand and borax are the two most common fluxes used on machine or soft steel, which is the common grade of steel used.

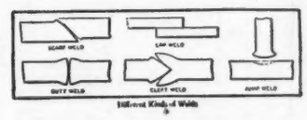


FIG. 11—DIFFERENT WAYS OF MAKING A WELDED JOINT

Much depends upon the material to be welded as to the method in which the parts are prepared and the type of weld best suited for the job.

Wrought iron is not used to any great extent. Some smiths use the borax plain, others mix it with equal quantities of fine, clean sand, putting in 25 per cent iron filings. Another good practice is to burn the borax before it is used, which yields better results. Heat the borax in a cast-iron jar until melted, pour on a bench plate or any flat surface so that it will form a sheet. Small pieces can be broken off for use or it can be pulverized, as desired. There are many welding compounds on the market, but for welding the ordinary machine steel, sand and borax are about as effective as any.

A flux that has been offered as a trade secret and sold on the market is made by this formula: Copperas, 2 oz.; saltpeter, 1 oz.; common salt, 6 oz.; black oxide of manganese, 1 oz.; prussiate of potash, 1 oz. Pulverize these ingredients and mix with them 3 lb. clean, white sand. If these fluxes will not work the fire is not as it should be or the operator does not use the proper judgment in welding heats.

For tool steel use a flux made of one part sal-ammoniac and twelve parts borax. For welding tool steel to iron or soft steel, flux made from the following formula is used: 500 parts by weight of borax, 70 parts sal-ammonac, 70 parts prussiate potash, 35 parts clean, unrusted iron filings. Pulverize and add water until thick paste results. Heat until very thick, stirring constantly; when cold pulverize and it is ready to use.

The job is heated and the ends formed for the welds. Being soft steel it should be worked at a yellow heat, as the steel can be forged more easily to shape at this heat. After the two ends have been properly formed for the weld, being sure that the surfaces that are to be welded together are crowned as shown in the sketch, the job is ready to be heated for welding. Place in the fire the pieces to be welded, cover well with coke (not green coal), heat slowly and steadily until the steel shows a bright yellow. This is the time to make the first application of the flux either by removing the piece from the fire (this is not recommended, although it is done by some smiths), or with a flux spoon made from a $\frac{3}{8}$-in. rod.

The heat is more rapidly increased and more flux added until a sparkling white heat is reached. When the steel has a glazed appearance and is sparkling freely, remove quickly from the fire and after a shake or a light tap to remove oxide, stick the laps together and with extremely light, rapid blows from the hammer at first and heavier blows as the weld proceeds, the job is completed. Do not work the steel too cold. If the weld cannot be finished down in one heat, reheat and work at the usual forging temperature.

FIGS. 9 AND 10—MAKING THE WELD IN THE FIRE

The flux and smelter should be applied when the specimen has reached a predetermined temperature. During this part of the work the temperature should be maintained as near constant as possible so as to produce a uniform weld.

A Geologic Time Scale*

Classification Using Numerals as Aid in Designating the Various Group Formations—Some Modificaton of Existing Nomenclature Necessary

By George H. Ashley
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A GEOLOGIC TIME SCALE is based on the order and fossil content of beds of sandstone, shale, and limestone which were originally laid down as sand, mud, or limy deposits in the sea. Earth movements have lifted and locally folded these rocks while erosion has cut into or planed off and exposed the edges, allowing beds several miles thick to be studied.

Remains of organisms then living in the sea were buried with the sediments and form a record of life at that time. This life horizontally was widespread, but changed rapidly with time, so the fossils make it possible to determine what rocks were laid down at any given time.

Owing to the rapid change in life forms and the slow accumulation of the rocks, it is now possible to distinguish several hundred life zones. For example, in 1839, certain rocks in the Jura Mountains of Switzerland, called the Jurassic system, were divided into three groups, as black, brown, and white. In 1858 the same rocks were divided on fossil evidence into eighteen zones, later increased to forty, which may ultimately be divided into a hundred zones. These very thin life zones are frequently delimited by the presence of one or more of the then existing dominant species of animals or plants.

Study of the fossils and rock relations seemed to indicate long periods during which no rocks were laid down. During these "lost intervals," generally representing periods of widespread uplift, life forms changed so as to be entirely different after than before the break in sedimentation. These great breaks formed convenient lines for dividing all the rocks into ten great "systems," named from a locality or some surface feature where first described or from some other circumstances, as follows: 1, Cambrian; 2, Lower Silurian; 3, Upper Silurian; 4, Devonian; 5, Carboniferous, 6, Triassic; 7, Jurassic; 8, Cretaceous; 9, Tertiary; 10, Quaternary.

Study of other areas eventually disclosed other rocks laid down during the "lost intervals" of the earlier

ERAS	SUB-ERAS	AGES—SYSTEMS	PERIODS—SERIES	EPOCHS—GROUPS
CENOZOIC (Recent Life) Era of Mammals Maximum thicknesses, 40,000 ft. Estimated duration, 61,000,000 years	LATE CENOZOIC QUATERNARY	O. QUATERNARY Age of ice and man 1,000,000 years	LOWER or PLEISTOCENE	100 Recent 99 Glacial
	EARLY CENOZOIC or TERTIARY Maximum thickness, 40,000 ft. Average thickness, 7,000 ft. 60,000,000 years	N. NEOGENE Average thickness, 35,000 ft. Duration, 30,000,000 years	UPPER or PLIOCENE Maximum thickness, 5,000 ft., in California	98 Merced, Calif. (1894) 97 Purissima, Calif.
			LOWER or MIOCENE (1833) Maximum thickness, 1,400 ft., in Nevada	96 San Pablo, Calif. (1898) 95 Santa Margarita, Calif. 94 Monterey, Calif. (1856) 93 Vacquero, Calif.
		M. EOGENE Average thickness, 3,000 ft. Duration, 30,000,000 years	UPPER or OLIGOCENE Maximum thickness, 12,000 ft., in Italy	92 Chattahoochie, Ga. (1891) 91 Vicksburg, Miss. (1840)
			LOWER or EOCENE (1833) Maximum thickness, 10,000-20,000 ft., in Washington	90 Jackson, Miss. (1850) 89 Claiborne, Miss. (1897) 88 Wilcox, Ala. 87 Midway, Ala. (1887)
MESOZOIC (Middle Life) Era of Reptiles Maximum thickness of rock, 100,000 ft. (Average 15,000 ft.). Estimated duration, 150,000,000 years	LATE MESOZOIC or CRETACEOUS (1822) Maximum thickness, 50,000 ft. Average thickness, 8,000 ft. 75,000,000 years Culmination of reptiles	L. CORDILLERAN (New) Maximum thickness, 24,000 ft., in Montana Average thickness, 3,000 ft. Duration, 35,000,000 years	UPPER or MONTANA (1888) (including Laramie)	86 Laramie, Wyo. (1877) 85 Bearpaw, Mont. (1905) 84 Judith River, Mont. (1811) 83 Claggett, Mont. (1905) 82 Eagle, Mont. (1899)
			LOWER or COLORADO (1877) (including Dakota)	81 Niabrara (1861) 80 Benton, Mont. (1861) 79 Bear River, Wyo. (1874) 78 Dakota (1862)
		K. COMANCHIAN (1887) Maximum thickness, 26,000 ft., in California Average thickness, 5,000 ft. Duration, 40,000,000 years	UPPER or WASHITA (1857)	77 Buda, Tex. (1900) 76 Del Rio, Tex. (1898) 75 Georgetown, Tex. (1900)
			MIDDLE or FREDERICKSBURG (1843)	74 Edwards, Tex. (1898) 73 Comanche Peak, Tex. (1857) 72 Walnut, Tex. (1891)
			LOWER or TRINITY (1888)	71 Paluxy, Tex. (1891) 70 Glen Rose, Tex. (1891) 69 Travis Peak, Tex. (1890)
	EARLY MESOZOIC or JURA-TRIAS Maximum thickness, 40,000 ft. Average thickness, 5,000 ft. 80,000,000 years Increase of reptiles—Evolution of mammals and birds	J. JURASSIC (1795) Maximum thickness, 18,000 ft., in California Average thickness, 2,000 ft. Duration, 40,000,000 years	UPPER	68 Upper 67 Middle 66 Lower
			MIDDLE	65 Upper 64 Middle 63 Lower
			LOWER	62 Upper 61 Middle 60 Lower
		I. TRIASSIC (1834) Maximum thickness, 30,000 ft., in Pennsylvania Average thickness, 3,000 ft. Duration, 40,000,000 years	UPPER or HOSSELKUS (California, 1892)	59 Upper 58 Middle 57 Lower
			MIDDLE or PITT (California, 1894)	56 Upper 55 Middle 54 Lower
			LOWER or INYO (California, 1885)	53 Upper 52 Middle 51 Lower

geologists, until now the great "breaks" dividing the systems are nearly or quite filled. By piecing together fossil evidence from various localities, a nearly complete story of the development of life can be told, or a complete column of rocks devised.

Closing the gaps in the records by transitional beds and life forms has made it difficult to draw the line between the great systems. Broader knowledge has also revealed other major earth movements than those first known and has led many geologists to subdivide some of the larger systems so that all of the systems shall be of more nearly equal length. Furthermore, some geologists believe that these great earth movements used as time markers were rhythmic. This idea, though not widely accepted, has served as a basis for the increase in the number of systems. Certain of these subdivisions have long been recognized in this country, although not always accorded the rank of a system. Believing that their recognition as "systems" is only a matter of time, they are so designated in the accompanying time scale.

Barrell Method of Estimates

A few years ago the late Professor Barrell, of Yale, made a comprehensive review of all the estimates of geologic time, including the results of the studies of radioactive minerals. He concluded that from the beginning of Cambrian time to the present was about 600 million years. Each system in the table represents from 30 to 50 million years. The figures given on the table are an average of Professor Barrell's estimates. They may be too short or much too long. The estimate for each system takes account of many factors, including, first, the area, the average and maximum thickness of rocks laid down; second, lithologic character of the rocks; third, the number and character of subdivisions already recognized or likely to be recognized in the future; fourth, contemporaneous earth movements (each system is supposed to represent in general a widespread sinking of continental areas, accompanied by deposition of sediments and followed by a general uplift).

I have found the need of adopting a standard time scale for the publications of the Pennsylvania Geological Survey. A preliminary study revealed no time scale universally accepted. State and federal surveys and textbooks differ in their usage. The principal subdivisions are the same but with major differences. For example: the U. S. Geological Survey treats the Cretaceous and Carboniferous as systems, whereas several modern textbooks divide the Cretaceous into two sys-

*Abstracted from *Engineering & Mining Journal-Press.*

PALEOZOIC (Ancient Life)
Era of Invertebrates, Fish, Amphibians
Maximum thickness of rocks, 100,000 ft. (average 25,000 ft.). Estimated duration, 400,000,000 years.

LATE PALEOZOIC or CARBONIFEROUS (1821) Maximum thickness, 24,000 ft. (Average thickness, 9,500 ft.) 115,000,000 years Age of coal and amphibians—Evolution of reptiles	H. PERMIAN (1841) Maximum thickness, 13,000 ft. Average thickness, 2,000 ft. Duration, 35,000,000 years	UPPER	50 Upper 49 Lower
		LOWER or OKLAHOMA Thickness in Pennsylvania, 1,300 ft.	48 Cimarron, Kan. (1896) 47 Big Blue, Kan. (1896)
	G. PENNSYLVANIAN (1888) Maximum thickness, 20,000 ft., in Arkansas Average thickness, 6,000 ft. Duration, 40,000,000 years	UPPER or PITTSBURGH (New) Thickness in Pennsylvania, 1,600 ft.	46 Monongahela, Pa. (1840) 45 Conemaugh, Pa. (1874) 44 Allegheny, Pa. (1840)
		LOWER or POTTSVILLE (1877) Thickness in Pennsylvania, 1,100 ft.	43 Kanawha, W. Va. (1877) 42 New River, W. Va. (1874) 41 Pocahontas, Va. (1896)
	F. MISSISSIPPIAN (1870) Maximum thickness, 7,000 ft. Average thickness, 1,500 ft. Duration, 40,000,000 years	UPPER or TENNESSEE Thickness in Pennsylvania, 3,000 ft.	40 Chester, Ill. (1857) 39 St. Louis, Mo. (1847)
		LOWER or WAVERLY Thickness in Pennsylvania, 1,300 ft.	38 Osage, Kan. (1888) 37 Kinderhook, Ill. (1866)
MIDDLE PALEOZOIC or SILURO-DEVONIAN Maximum thickness, 20,000, ft. (Average thickness, 5,000 ft.) 90,000,000 years Age of fish—Evolution of amphibians	E. DEVONIAN (1839) Maximum thickness, 20,000,000 ft. Average thickness, 4,000 ft. Duration, 50,000,000 years	UPPER or SUSQUEHANNA (New) Thickness in Pennsylvania, 3,000 ft.	36 Chemung (inc. Catskill), N. Y. 35 Portage, N. Y. (1840) 34 Genessee (inc. Tully), N. Y.
		MIDDLE or ERIE Thickness in Pennsylvania 800-14,000 ft.	33 Hamilton, N. Y. (1839) 32 Marcellus, N. Y. (1838) 31 Onondaga, N. Y. (1838)
		LOWER or MORGAN (New) (Morgan County, W. Va.) Thickness in Pennsylvania, 1,000 ft.	30 Oriskany, N. Y. (1838) 29 Helderberg, N. Y. (1838)
	D. SILURIAN (1835) Maximum thickness, 7,300 ft., in Massachusetts Average thickness, 2,000 ft.	UPPER or CAYUGA (1864) Thickness in Pennsylvania, 1,300 ft.	28 Monroe, Pa. (1882) 27 Salina, N. Y. (1863)
		LOWER or ONTARIO (N. Y., 1843)	26 Niagara, N. Y. (1842) 25 Clinton, N. Y. (1841) 24 Medina, N. Y. (1839)
EARLY PALEOZOIC or CAMBRO-ORDOVICIAN Maximum thickness, 55,000 ft. (Average, 10,000 ft.) Estimated duration, 200,000,000 years Age of invertebrates—Evolution of vetebrates	C. ORDOVICIAN (1879) Average thickness, 4,500 ft., in Pennsylvania Duration, 60,000,000 years	UPPER or CINCINNATI (1859) Thickness in Pennsylvania, 2,800 ft.	23 Oswego, N. Y. (1841) 22 Hudson, N. Y. (1840) 21 Utica, N. Y. (1841)
		MIDDLE or MOHAWK (1840) Thickness in Pennsylvania, 500 ft.	20 Trenton, N. Y. (1837) 19 Black River, N. Y. (1842)
		LOWER or CHAZY (N. Y., 1842) Thickness in Pennsylvania, 1,000 ft.	18 Blount, Tenn. 17 Stones River, Tenn. (1851) 16 Big Buffalo, Ark.
	B. CANADIAN (1874) Average thickness, 3,000 ft., in Pennsylvania Duration, 50,000,000 years	UPPER or BEEKMANTOWN (1890) Thickness in Pennsylvania, 2,500 ft.	15 Bellefonte & Axeman, Pa. (1911) 14 Nittany, Pa. (1911) 13 Stonehenge & Schaghticoke (1903)
		LOWER or OZARK (1891) Thickness in Pennsylvania, 300 ft.	12 Gasconade, Mo. (1892) 11 Copper Ridge, Tenn. 10 Little Falls, N. Y. (1903)
	A. CAMBRIAN (1835) Maximum thickness, 40,000 ft., in British Columbia Average thickness, 4,000 ft.+ Duration, 90,000,000 years	UPPER or SARATOGA (1903) Thickness in Pennsylvania, 3,600 ft.	9 Hoyt, N. Y. (1910) 8 Potsdam, N. Y. (1838) 7 St. Croix, Wis. (1873)
		MIDDLE or ACADIA (1874) Thickness in Pennsylvania, 4,000 ft.	6 Upper 5 Middle 4 Lower
		LOWER or WAUCOBA (1912) Thickness in Pennsylvania, 5,800 ft.	3 Upper 2 Middle 1 Lower

tems and the Carboniferous into three systems. In starting the publications of a new series of reports it seemed desirable to review the whole subject critically and if possible to make a time scale combining the best available information.

In reaching the conclusions, all pertinent factors were considered. Thus, the Cambrian system is not divided, although it is probably as long and the rocks are several times as thick as the Silurian. Cambrian time, though apparently favorable to thick formations of rock, did not foster rapid development of life forms, so that minute subdivisions on the basis of the fossils is almost impossible. However, some of the later systems represented by relatively thin series of rocks are so fossiliferous as to be divisible into many thin zones. This division multiplied the number of individual bed names.

Neogene and Eogene, as here used, have been used for some years for the Tertiary. Textbooks have used Comanchian for Lower Cretaceous for about twenty years. Geologists recognize that the Comanchian in America is not exactly the same as the Lower Cretaceous in Europe. Cordilleran is therefore introduced to designate the time and the rocks from the end of the Comanchian to the beginning of the Eogene. Permian, Pennsylvanian, and Mississippian, as subdivisions of the Carboniferous, have been used for many years. The Ordovician, though estimated to be of nearly the same duration as the Carboniferous, has here been divided into two parts, Ordivician and Canadian. Some geologists would classify the Ozark rocks as one system, the Beekmantown and Chazy as a second, and the Mohawk and Cincinnati as a third. My studies, however, have failed to convince me that either the Ozark or Cincinnati rocks are of correlative rank with Silurian, Devonian, Pennsylvanian, or Jurassic. The Ozark "period," including the upper part of the "Ozarkian system" of Ulrich, is placed in the Canadian. The lower part of Ulrich's "Ozarkian system" is included in the Cambrian. The Cambrian, although of long duration and comprising a great thickness of rocks, is considered as one system, as it is not readily divisible.

The rocks have been divided into systems and the systems subdivided into two or three "periods," which are designated as upper, middle and lower, or upper and lower. These periods have been given names which are in general use. The Jurassic periods have not been given geographic names, because the Jurassic is not well represented in this country. Several names are used here in a broader sense than is customary. For example: Montana is used for the Upper Cordilleran, as including all rocks between the top of the Colorado and the base of the Eocene. The Montana therefore includes the Laramie, which was formerly independent. The Dakota sandstone has been included with the Colorado series in the Lower Cordilleran system.

In like manner each series or period has been divided into two to five groups, each group representing an epoch of time. Most of these groups have been known in the past as "formations" or the smallest unit that can or is likely to be shown on a map. More detailed work, however, has divided formations into named parts and subdivisions that are often recognized across several states. In illustration: The Allegheny group, (formerly the Allegheny formation), is now divided into the Freeport, Kittanning, and Clarion formations. Each of these formations is comprised of several beds of coal, clay, limestone, sandstone, and shale. Thus, the Freeport formation contains (in descending order): Freeport, upper coal; Freeport, upper clay; Freeport, upper limestone; Bolivar, flint clay; Butler, sandstone; unnamed shales; Freeport, lower coal; Freeport, lower clay; Freeport, lower limestone; Freeport, sandstone and unnamed shales.

The time scale was made with two ideas in mind: first, to make a time scale in which the various "systems," "series," "groups," and "formations" would be of comparable rank. Thus a "group" of rocks has an average thickness of several hundred feet but usually less than a thousand feet. A "series" averages several thousand feet thick. The "systems" are usually represented by tens of thousands of feet. The "formations" are a few hundred feet thick, or more commonly less than one hundred feet. The thicker members of these correlated divisions usually represent masses of rocks apparently incapable of ready subdivision.

The second object was to devise, if possible, some method by which the position of any bed in the stratigraphic column could be handily designated. After the table was practically in the present form, I noticed that there were almost exactly one hundred epochs. Therefore, if it is assumed that all time from the beginning of the Cambrian had been divided into one hundred more or less equal epochs, and if these were numbered from 1 to 100, the general position of any epoch in the column would at once be clear. Furthermore, many rock groups in Pennsylvania, as in other places, do not exactly correlate with the epochs indicated in the time scale.

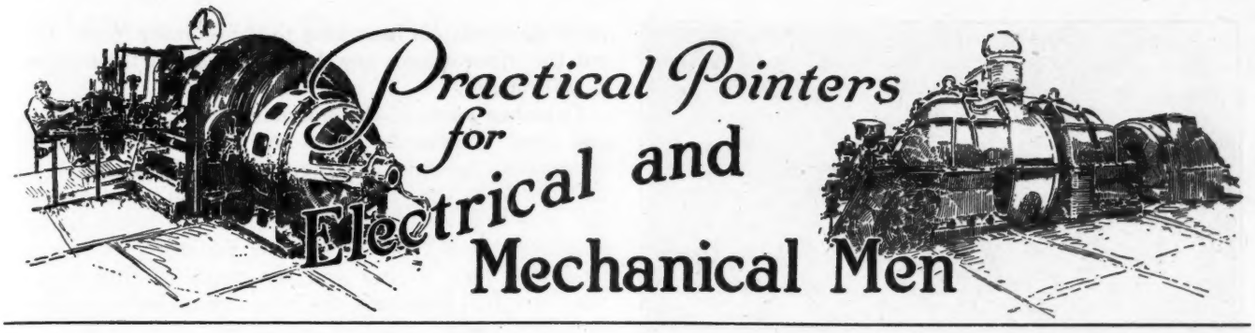
The Use of Numerical Symbols

In order to have exactly 100 epochs, the table as originally written was slightly modified. Thus, in the Upper Devonian five epochs, the Tully, Genesee, Portage, Chemung, and Catskill, were reduced to three. The Tully, a thin limestone occupying a relatively limited area in central New York, and unworthy of group rank, was combined with the Genesee. Likewise the Catskill was combined with the Chemung, as it has long been known to be in part, if not in whole, simply the eastward extension of the Chemung.

The Pennsylvania Geological Survey proposes to use the name of a formation or bed with its group name. Thus, the Becraft limestone would be referred to (except where used frequently) as the Helderberg limestone, 29 (Becraft). The name Helderberg, in use since 1838, has gained certain familiarity which at once reveals to the frequent reader of geological reports the place of the Becraft limestone. The number 29 shows that the rock is a little above the middle of the Paleozoic and should be of greater value in reminding the reader of the relative position of several beds mentioned.

In the table here given account has been taken of what might be called the "historic" periods only. Below the Cambrian lie great thicknesses of rocks believed to represent vast areas of time during which life was slowly unfolding; but of that life only the most meager traces remain unless we except limestones, iron ores, and certain other rocks as prima-facie evidence of life.

Thus before the Paleozoic era came the Proterozoic and Archiozoic eras, each possibly as long or longer than the Palezoic. The Proterozoic, represented by Algonkian rocks, which in Canada are estimated to have a thickness of 74,000 ft., is divided into the Keweenawan and Huronian ages or systems. Archiozoic time, represented by Archean rocks, with an estimated thickness in Canada of 94,000 ft., has been divided into Laurentian and Keewatin time.



Safety in Gas Welding and Cutting

IN A paper recently prepared by C. F. Worfolk, of the faculty of the Michigan State Automobile School of Detroit, for the National Safety Council, the following suggestions and precautions were offered to employers of welders and welders themselves:

A canvass of industrial plants reveals the fact that burns resulting from carelessness form the majority of injuries to persons in the oxyacetylene welding trade. Injuries to the eyes due to failure to wear proper goggles are second. The employment of only properly trained men for this work would greatly reduce accidents from these two sources.

Injuries from fires and explosions due to defective apparatus are comparatively few now, thanks to the many improvements that have been made in appliances. There are some, however, and in most cases they could be prevented. We might class them, in their order of frequency, as:

CLASSIFIES INJURIES IN ORDER OF FREQUENCY

(1) *Gas fires*; due to leaky, defective, or open valves in acetylene tanks. An open valve needs no comment. It is just plain carelessness. The average welder has a tendency to become careless. Perhaps in his case familiarity breeds contempt. He is quite likely to get his torch too close to the tanks or the manifolds. Unless the shop is very well ventilated indeed, any escaping acetylene will lie near its sources and the heat of the torch will ignite it. Such a fire is difficult to extinguish. An extinguisher of the Pyrene type is no doubt one of the best means of stopping this blaze, but a tank of carbon dioxide or carbonic acid gas similar to that used in soda fountains will have such a blaze out very quickly. All welding shops should have a tank of this gas on hand for such emergencies.

(2) *Gas explosions*; due mostly to getting a mixture of the gases into a confined space and then igniting it. Shop explosions frequently are produced in this way. They are almost invariably due to leaky apparatus or to carelessness.

(3) *Tank explosions.* These are very rare, as the tanks are built to withstand very high pressure and in each tank is a safety plug intended to blow out and relieve the pressure before the bursting point is reached. The blowing out of this plug at 4,000 or 5,000 lb. pressure can be attended with very exciting results. Tank pressures are known to run up to 4,000 lb. sometimes. This is not the filled pressure; but with perhaps 1,800 or 2,000 lb. of gas in the tank if it is left in direct sunlight or in a very warm temperature the pressure begins to mount. These tanks should be stored in a cool place.

(4) *Valve explosions.* These are likely to occur only with old-style apparatus and because the operative has let it get into bad condition. There have been many accidents with old-style apparatus but today most of it is in the discard.

Frequent and regular inspections should be made to insure proper condition of apparatus.

The operator himself presents a much more difficult problem to deal with than the apparatus he handles. He is quite likely to be a green boy unfamiliar even with the dangers attendant upon the use of ordinary city gas. Somewhere he has seen a workman use a torch and, inspired with the belief that he can do equally well, he signs a long story to the employment man and gets a job as a "welder." The worst of it is, the work looks easy. Anyone can turn on a valve and light a torch, no matter how ignorant he may be of the tremendous forces he is setting in motion. At times industry seems to be woefully short of acetylene welders and the employment man at his wits' end to obtain competent hands grasps at the first straw and so our green hand goes to work.

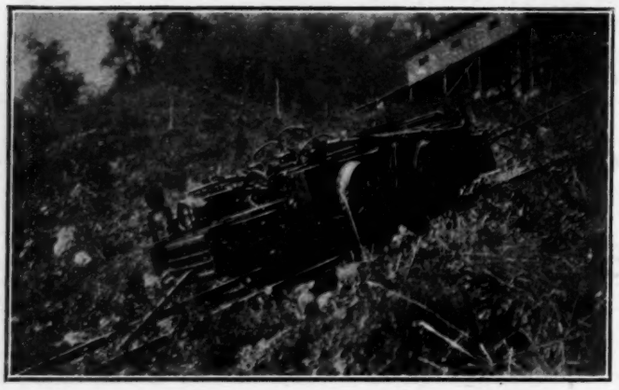
What does he know of hot or cold metal, of expansion or contraction? How is he going to harness this molten destruction to constructive purposes? Perhaps the boss welder gave him a few inadequate instructions. Perhaps all he said was "There's your place; hop to it." He hops. He heats a metal article of some sort and fails to mark it properly. Along comes another workman. The article looks just the same to him cold or hot and he picks it up. The first-aid man now has a nasty burn to fix up. The injured workman is off the job for a few days and there is compensation to pay for his injury and enforced vacation.

Burns form the vast majority of welding injuries. The man who gets burned is not always the welder. Burns from picking up hot metal that has not been properly marked or safeguarded lead the list. Chalking the word "hot" on the metal isn't going to help the man whose only English is "No spik Inglis" unless you tell him very forcibly what it means and train him to look out for it in the welding shop.

Mine Locomotive Taken Up Mountain Side

THE problem of getting heavy mining machinery from the railroad tracks in a deep valley to the coal tipple or mouth of the mine is sometimes very real and difficult. The Branch Coal & Coke Co. at Elverton, W. Va., recently was confronted with the task of taking a new 5-ton mine locomotive from the railroad track to the mine. The only feasible way was up the steep mountainside and it was decided to build a temporary inclined plane.

When finished the plane was 1,600 ft. long and had an average grade of 40 per cent. After the locomotive was unloaded from the railroad car it was run a short distance to the foot of the plane, where it was at-



GOING UP ITS HEAVIEST GRADE
While in service locomotives usually negotiate some stiff grades. Here is one on which the locomotive needs help.

tached to a steel rope. At the top of the plane was a small hoist run by a 6-hp. motor.

The trip up the plane was made slowly and without mishap. As a safety precaution, a drag was fitted to the rear of the locomotive as shown in the photograph.

Chicago, Ill. GEORGE F. PAUL.

Care and Repair of Commutators

Cleaning.—The band over the front V-ring of a commutator should be wiped off every month. After cleaning, painting with an air drying varnish makes cleaning easier next time. Painting every six months is advisable.

Smoothing Commutator Face.—Flat spots, high or low bars, ridges, burned spots, etc., should be smoothed up. The armature should be removed from the locomotive and placed in a lathe for turning the commutator if its face is very rough. Holes left by defective mica or pits in the side of bars can be filled with commutator cement supplied by dealers.

Undercutting.—The commutator should be re-undercut before it is worn flush, since the groove left will guide the saw and make the work much easier. Where commutation trouble is frequent, it is good practice to use a V-shaped hand tool to round the edges of the undercut grooves between bars to about 1/42-in. radius. This can be done with the motors in the locomotive. All particles of mica, copper or dirt should be removed from the grooves after undercutting.

Removing Leads From Commutator Neck.—A thin drift driven in the top of the slot in the neck toward the shaft between the side of the commutator neck and the top filling piece will loosen the filling piece so that it may be forced out by a gouge. Similarly, windings may be taken out of the first bar. With one set of leads removed there is enough space left to bend one side of the next neck, thus permitting the removal of the leads by means of the gouge. This can be done without heating the soldered joints.

Replacing Parts—Commutator and Winding Left on Shaft.—Where a small number of bars are to be replaced it is not necessary to remove all the leads from the armature neck to take the commutator from the shaft. Stand the armature on end, commutator up. Mark each separate piece so that it may be put back in its old position. After removing the ring nut or bolts, take out the metal V-ring and mica V-ring. If the bars are tight, tapping with a wooden or rawhide mallet will loosen them. The new bar must be filed to the shape and thickness of the one which it replaces, to prevent the new bar or the old bars next to it becoming loose. Clean out the space where new bars fit and tap them in with a soft mallet.

Detached parts of the commutator must be kept clean and dry. When the parts are ready for rebuilding, sandpaper the mica V-ring. Clean the metal V-ring and the V in the commutator bars, and paint the V in the bars with shellac. The shellac and brush must be absolutely free from all dirt or moisture. After putting the mica V-ring and the metal V-ring back in their original positions, the ring nut or bolts are drawn up fairly tight

Painting the threads of the ring nut or bolts with very thin white lead will make it easier to remove these parts next time. The commutator should now be heated to 110 deg. C. in an oven where the air is dry and the ring nut or the bolts drawn up tight while the commutator is hot. The commutator should then be turned in a lathe.

Test after these repairs should be 110 volts alternating current between commutator bars and 1,000 volts alternating current to ground.

Replacing Parts — Commutator Removed From Shaft.—When it is necessary to replace the rear mica V-ring, a number of segments, or a complete set of segments, it is advisable to remove the commutator from the shaft. The method of taking down and rebuilding is the same as before described, but care should be exercised, to heat the commutator thoroughly to soften up the new mica parts, so that the ring or bolts can be drawn up tight. To this end when the commutator is assembled it should be put in an oven and heated to a temperature of 125 to 140 degrees C. While at this temperature the commutator is placed in a press, using a pressure of 20 to 25 tons for a 50-hp. motor, and the ring nut is drawn up tight while under pressure.

Complete sets of segments are shipped, temporarily banded together, with the mica and copper segments in their proper position. The complete set should be assembled in the commutator as a unit and the temporary band should be removed just before the commutator is finally tightened.

Tests after these repairs should be 300 volts alternating current between commutator bars and 2,000 volts alternating current to ground.

Important Details.—Commutator well undercut $\frac{1}{64}$-in. maximum; $\frac{1}{32}$-in. minimum.

Front V-ring clean and well painted.
Edges of commutator face rounded, $\frac{1}{64}$-in. radius, front; $\frac{1}{32}$-in. radius, rear.
Commutator free from oil.
Rear of commutator sealed from dirt and moisture.
Commutator tight.
Face of commutator smooth.
Neck full width
Mica extending $\frac{1}{32}$-in. at rear.
Free from grounds and short-circuits.

12,382,000 Barrels of Cement Made in June

Production of portland cement during June, 1923, according to the U. S. Geological Survey, totaled 12, 382,000 barrels compared with 11,245,000 barrels in the corresponding month of 1922 and 12,910,000 barrels in May, 1923. Shipments for the month were 13,307,000 barrels against 13,470,000 in May a year ago and 14,257,000 in May, 1923. Stocks at the end of June were 9,219,000 barrels compared with 10,718,000 barrels at that period in 1922 and 10,144,000 barrels at the end of May, 1923.

Should Speed of Air Through Inlet of Fan Be Limited to 2,000 Ft. per Minute?

By J. R. Robinson
Consulting Engineer, Pittsburgh, Pa.

I AM frequently asked, "At what speed should air pass through the inlet of a fan?" and then the questioner supplements his inquiry with the words, "I know it ought not to exceed 2,000 ft. per minute, but how do you go about to find it?" When I ask him how he arrives at the 2,000 ft. per minute he usually says that he saw that figure given in some textbook or in some manufacturer's catalog.

When fans were first introduced at coal mines they were built of wood, and the carpenters who originally erected them put them together by rule of thumb with a hatchet and a saw and had no scientific data to guide them. Quite by chance the inlet, or "eye" of the fan, as it was called by the earlier builders, was made about five-eighths of the diameter of the wheel, and as these fans were slow-moving machines it also happened that the speed of the air usually did not exceed 2,000 ft. per minute through the inlet orifice of the fan.

All these things just happened, but builders of machinery are careful to copy what seem to be the most successful machines without much investigation as to why the machines are successful. If they can get them on the market and make profits from their sale they are not likely to be inclined to go further. The investigating and tabulating of data of such machines must be done by some crank who is not considered practical by the manufacturers.

Inlet Speed Determined by Outlet Speed

The speed of the air passing through the inlet orifice of the fan is determined directly by the speed at which the air is leaving the tips of the fan blades. It is a well-known fact that the tip speed of the fan blades determines the speed of the air leaving the blades. This tip speed is dependent on the shape of the blades and the manner in which they advance or retreat from a radial plane. But in all fans a certain tip speed is required to give a corresponding speed to the air as it leaves the blades.

Now the speed with which the air leaves the blades creates a certain pressure which is measured by the water gage, so that we have for a given water-gage reading a corresponding speed of the air, the values being interchangeable. For instance, if the water-gage reading is 1 in. the speed of the air is 3,946 ft. If the water-gage reading is 2 in. the speed of the air is 5,587 ft. If the water-gage reading is 6 in. it is 9,672 ft. per minute. Now it is obvious that if we are running our fan to make 1 in. of water gage and the speed of the air leaving the blades is 3,900 ft. we can have a higher velocity in the intake orifice of the fan than 2,000 ft. per minute, for on the outside of the wheel we have the atmospheric pressure forcing the air into the wheel to take the place of the air we expel from the wheel due to its rotation, and this atmospheric pressure is upward of 14 lb. per square inch of pressure where our 1 in. of water gage is only 5.2 lb. per square foot.

In other words, there is about 400 times as much pressure on the outside of the wheel as the depression we make on the inside of the wheel due to its rotation when we are making a 1-in. water gage. The air will therefore find its way into the wheel due to the atmospheric pressure, and the speed at which it goes into the wheel through the intake will be directly proportional to the speed of the air as it leaves the tips of the fan blades.

It will be seen, therefore, that the fan is not performing work on the inlet of the wheel. The atmosphere takes care of that, so it may be well to cite a few illustrations of a practical nature to prove that a fan may work with the greatest economy while the air is passing through the inlet orifice at a speed greater than 2,000 ft. per minute.

Inlet Speed, 3,400 and 6,000 Ft. per Minute

A 6-ft. multivane fan working at the Donald No. 2 mine of the Consolidated Coke Co., at Gray's Landing, Pa., is making 105,000 cu.ft. of air per minute at 1.6 in. water gage. It is using 41.6 hp. on this load. It is a double-inlet fan and the sum of the two intake orifices is about 38 sq.ft.

Now if no "vena contracta" is applied to this intake orifice the mean speed of the air is upward of 3,000 ft. per minute and if a "vena contracta" of 80 per cent is applied the mean speed of the air is upward of 3,400 ft. per minute. This fan is belted to a 50-hp. motor and allowing 5 per cent loss for the belt and 10 per cent loss for the motor the fan is running at about 77 per cent mechanical efficiency.

There is a 4 ft. 9-in. multiblade fan working on the Emeigh Run mine of the Cherry Tree Coal Co., near Cherry Tree, Pa., which is making 116,000 cu-ft. of air per minute at 5.4 in. water gage. It is using 127 hp. on this load. It is a double-inlet fan and the sum of the two inlets is about 24 sq.ft. If no "vena contracta" is applied to this intake orifice the mean speed of the air is upward of 4,800 ft. per minute and if a "vena contracta" of 80 per cent is allowed the mean speed of the air is upward of 6,000 ft. per minute. This fan is direct-connected to a 150-hp. motor and, making no allowance for loss in the motor, the mechanical efficiency of the unit is upward of 77 per cent.

Planning to Overcome Imaginary Difficulty

Only a few years ago a number of fan builders were putting scoops on the blades of the fan wheel at the intake orifice. This practice was due to the manufacturers' want of knowledge of the natural laws governing the flow of air and also to the old myth that it was necessary to limit the speed of the intake air to 2,000 ft. per minute.

It will be seen from these illustrations that the air will find its way into the fan at upward of 2,000 ft. per minute if the fan wheel is making a pressure in excess of that required to create that speed.

This old myth of inlet orifice speed is the direct cause of many installations being wasteful of power. As an illustration of this I will cite an instance that occurred a short time ago. A coal company was about to install a fan to make 80,000 cu.ft. of air per minute when the required water-gage pressure would be 4 in. to pass the air through the mine. Owing to this old myth of the limit of 2,000 ft. per minute the company's engineer insisted on a fan much too large for the work, and it is now running at less than 30 per cent mechanical efficiency. The manufacturer who made the fan guaranteed his fan for 75 per cent mechanical efficiency and the officials at that mine are one and all still wondering now what is the matter with the installation.

Coal Men Could Settle Own Trade Disputes, Avoiding Aches and Pains of Court Action

In arbitration of business difficulties between coal men lies the cure for many harassments of coal selling, Vincent Gilroy, representing the Arbitration Society of America, told the American Wholesale Coal Association at its Cincinnati convention in June. Producers of coal, suffering periodically in disputes over price, quality and whatnot with buyers located all over the country, may see great benefits in arbitration over the cumbersome and none too just methods of American courts.

If an arbitration clause were written into every contract between producer and buyer, each agreeing to submit any disputes arising out of the contract to three coal men, one chosen by the producer one by the buyer and the third by the chosen two, or to a permanent commission, or to some other form of arbitration, the Arbitration Society of America believes much good would be accomplished including these advances over present methods of "going to court": (1) Settlements would be speedier; (2) they would be more just because the decisions would be by men who know the problems of the trade and because ignorant juries would not be confused by so-called "experts," by oratory, or by technical rules of evidence; (3) trade secrets would not be divulged to the public; (4) the courts of the land would be relieved of a crushing burden of litigation; (5) less underhandedness would be attempted at the expense of the producer of coal because present evasions through the courts could not be practiced.

"It seems to me that there is a vital need for coal men to realize the fact that there is a trade evil that needs correction," said Mr. Gilroy. "That evil relates to the disputes that arise between you and the men that are purchasing the coal from you and that fail to make the proper payments, or set up fictitious defences against your just claims. Let me say that throughout the United States, in every line of industrial activity, we have found the same degree of dishonesty and unwillingness to pay just obligations that you are confronted with.

Ruse to Evade Contract Obligation

"Suppose you, separated by a great degree of space from the purchaser, ship your product, relying upon his honesty and character, only to find that when your commodity has reached its destination and has left your control, the purchaser seeks to evade the obligations of his contract and refuses to pay the agreed price. The refusal is based upon technicalities. Really it is an attempt to obtain the coal at a price below the contract obligation, and it succeeds in many instances because you, realizing the cost and ultimate loss of litigation, do not seek your just means of recompense. You know that the violation of a contract means that you are required to go into a court of law to place it before an unfriendly and, maybe, an ignorant jury, and in the end you receive a verdict that will not accord you justice and which will mean loss to you.

"The old jury system grew up in Anglo-Saxon times, when it was held that a man with any sort of litigation should place it before a jury of his equals—equals in trade and business. But today how is it? Men are selected from every avenue of business and industrial activity; men who are unfamiliar with you and your character and your business standing, and ignorant of the customs of the trade in which you are engaged. When the case is finally submitted there is a jumble of evidence from which they must select the truth. The judge, a man selected because of his superior knowledge of the law, but unfamiliar with your business, has charged them on the law of the case, and they retire and deliberate. They sit there, and in many instances draw lots to see which side shall be given the victory. And you are in many instances the victims.

"Then again litigation is the subject of deliberate delay. Delays by men who refuse to meet their just obligations and know that by appeal to court they can set back the day of reckoning until it suits them to settle or until they tire you out, and make you take a smaller amount of compensation than you are entitled to.

"While I say this condition is particularly pertinent to your industry it applies to every large industry in the United States. With a realization of this condition, gentlemen belonging to the New York Chamber of Commerce sought to devise a better system, a more ready means for determining business controversies, and they developed the 'New York Law of Arbitration.'

"Arbitration is not a new principle. It is recognized in every state in the Union. Any two men who have a controversy may submit it to an umpire under the law in the State of New York. But there was no means whereby a man could be compelled to submit to arbitration. When the decision was rendered there was no means to put it into effect. Parties refused to be bound by it. The Chamber of Commerce in New York agitated for several years to have a law placed on the statute books which would make controversies once submitted to arbitration binding upon both parties. That law was finally passed in 1920. Now, men who have differences in business and agree in writing to submit to arbitration are bound to do so and are bound by the decision which is made by the arbitrators.

Similar Laws Introduced in Every State

"The Arbitration Society of America was organized to give this publicity. Charles M. Schwab is the president. Others of similar character are officers. Since 1920 we have introduced into every state Legislature of the Union laws similar to this and we are going to keep on with our efforts until we are successful.

"The operation of this law in New York is as follows: Two of you coal men have a difference of opinion—legitimate in every way. You have different viewpoints. A difference arises. We have provided for every trade association that wants to adopt this system a clause by which the men who enter into that contract agree to submit every question in controversy to arbitrators selected by the parties themselves in a manner specified by the clause. Once signed, the contract is binding. Men cannot evade submitting their controversy to a tribunal thus selected.

"The result is as follows: You men, instead of setting your controversy before an ignorant jury and judge who is only familiar with the technique of the law, select your own judge and jury, men who will come from your own industry, who are familiar with every trade and trade custom that govern you. You pick your men and then instead of waiting, you fix your day for a hearing. You don't have to have your witnesses attending day after day in a vain attempt at being heard. Nor are they burdened by the technical rules of law. They are not confused by men legally trained. They can tell their story in their own way. The arbitrators will make their decision.

"Experts" Easily Obtainable for Either Side

"In a court, to establish a trade custom before a jury you men have to call an expert (and you should know it is just as easy to employ experts on one side of a controversy as on the other) and the result is confusion. But the jury must decide the truth. It is a toss up the way most legitimate controversies are determined. In arbitration we don't have that. The arbitrators themselves select the leading men or the leading firms of the country, whose word upon trade customs could be received without question.

"Now a court of law is a public tribunal. The public is permitted to listen to all proceedings. In many instances men have business secrets which are sacred. Instead of publishing them before a jury in a court of law, you are able to have the testimony given without a violation, before an arbitration committee

"It seems to me that associations composed of men who control the business of the coal industry should adopt a clause in every contract made with a jobber or retail dealer to the effect that any controversy will be submitted to arbitration by the rules of your organization. Then when a controversy does arise these men will be compelled to submit their differences to arbitration, and if they do not you can place them upon the list of discredited ones. You can circulate this list and you will all know with whom you can deal on a fair basis. You will cut your losses to a great extent."

Problems of Operating Men

Edited by James T. Beard

Retimbering Old Slope to Open a Longwall Mine

Need of Providing Good Headroom on Main Slope—Double Timbering or Hitches Cut in Ribs Alike Inefficient—Support Crossbars on Cribs

SOME time ago an inquiry appeared in *Coal Age* regarding two methods attempted in the retimbering of an old slope for the purpose of opening a longwall mine in a 4-ft. coal seam. The roof being a frail soapstone had fallen to a considerable height requiring the lagging to be built up in the form of cribs above the timber-sets. The inquirer stated that in the first attempt, double timbering was used to support the lagging.

Finding that this first method was unsatisfactory, the plan was changed and the crossbars supported in hitches cut in the ribs, believing that the timber would then settle more uniformly with the strata than when double timbering was used as at the first. The sketch shown in the inquiry (Mar. 1, p. 380) indicated that the crossbars were set in below the roofline, which would give scant headroom for haulage on the main slope, in a 4-ft. seam, after deducting the necessary 6 or 8 in. for depth of the collarbeam.

Such a plan, would suggest the idea that very low cars were used in that case. However, in a later article, which appeared in the issue for May 10, p. 760, it was explained that the hitches supporting the collarbeams were cut in the solid formation, about 3 ft above the coal, and this would provide ample headroom on the haulage slope.

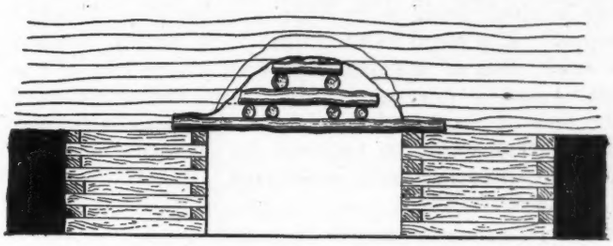
Effect of Pressure in Longwall Work

The situation is not entirely clear regarding the proposed development of the longwall mine, after the slope has been put in suitable condition. If, as suggested in the reply to the inquiry, it is the intention to extend the longwall work above the foot of the slope and extract the coal on either side of that opening, to my mind, neither of the methods proposed will prove satisfactory for the support of the pressure that will undoubtedly be thrown on the slope as the work proceeds.

In my opinion, the roof weight due to the extraction of the coal, will develop crevices and breaks in the supporting pillars that will eventually let down the timbers and give no end of trouble if the crossbars are to be supported in hitches cut in the ribs. Or, if double timbering is employed as first suggested, the oncoming weight will break the posts and cause them to bulge into the roadway where they would be a constant menace to the safety of drivers and motormen.

At the best, either of these methods would require constant renewals in the timbering of the slope. Allow me to suggest, therefore, the adoption of a method that I have seen successfully employed under practically the same conditions as those described in this instance. The plan was put in operation after other methods had been tried and failed. The increased first cost, I may say, is largely offset by the coal recovered from the ribs when the cribs or cogs are built.

As shown in the accompanying figure, which needs little explanation, substantial cribs are built on each side of the roadway. In order to make room for these cribs, skips from 4 to 6 ft. wide are taken along the rib on each side of the road. Owing to the soft nature of the roof, in this case, it will be necessary to build up the cribs shortly after the coal is taken out. To provide the required headroom over the track, in low coal, it will be necessary to cut channels in the soft formation



SUPPORTING TIMBERS ON CRIBS AT ROADSIDE

above the coal for the insertion of the ends of the collars, which should project well over the cogs, as indicated in the figure.

In the adoption of this method, the weight due to the extraction of the coal will be taken by the cogs and what breaks occur will be on the line of the ribs, inside of the cogs, and not on the edge of the roadway, as would result in either of the methods previously mentioned. What settlement of the roof takes place will be gradual if the cogs are well built.

In addition, the collarbeams being supported on the cogs will settle with them without breaking and most of the evils of the other method will be eliminated. It will be found that cost of maintenance of the road on the main slope will be relatively small and this, together with the extraction of the rib coal, will practically offset the expense of building the cogs.

Victoria, B. C. L' Inconnu.

OTHER LETTERS

REFERRING to the best method of supporting the roof when retimbering a 500-ft. slope, 8 ft. wide, on a pitch of 20 deg., where the roof has fallen to a considerable height, and the timbers are badly broken because of the soft nature of the soapstone overlying the coal, *Coal Age*, March 1, p. 380, permit me to say, regarding the two methods suggested, that of double timbering has little to recommend its adoption under the conditions named.

The inquiry recalls an instance in my own personal experience where several roadways, under conditions

similar to these, were kept open with great difficulty. During a single weekend, the floor or bottom on these roads heaved so badly that the headroom was reduced from 5 ft. 6 in. on Friday night, to a scant 3 ft. on Monday morning.

The inquirer proposes to open up a longwall mine and haul the coal out through this old slope. From experience in longwall mining, I have always found it a good and safe plan, where the coal is sufficiently strong, to use heavy collarbeams, old rails or I-beams, hitched into the ribs, either in the coal itself or into the stratum overlying the coal.

Advantages in Use of Rails or I-Beams

Not only does this method afford increased headroom on the road and save the timber required for legs to support the collars; but a still greater advantage gained is the lesser liability to accident by reason of a derailed car or wreck knocking out the legs and causing a heavy fall of roof and much delay, to say nothing of the expense of cleaning up the entry and making the necessary repairs.

Where rails or I-beams are employed these can be readily taken out and used again when a road is abandoned. In my own experience, we have never failed to lose a single steel beam when abandoning a longwall section. If a beam was too tight to be readily loosened a small piece of dynamite, exploded at one end of the beam, quickly overcame the difficulty. The first cost of the steel is soon made up in the saving of labor and timber that would be required for constant renewals, as posts and collarbeams are broken. LONGWALL.

McKeesport, Pa.

PERMIT me to say that my experience in retimbering an old road, under conditions much like those described in the article entitled "Timbering High Falls On Entries," *Coal Age*, May 10, p. 760, has taught me that the safest plan to adopt is to hitch the crossbars into the ribs on either side of the entry, provided the coal is solid enough to support the bars.

In place of wooden bars for that purpose, I have found there is a great saving in the use of railroad iron weighing from 40 to 60 lb. per yd. For an 8-ft. entry, we have used these rails cut into 9-ft. lengths. A 6-in. hitch is cut in the rib on one side of the entry and a slant drivehole is made on the other side to permit the bar to be slipped into place.

Alternate Plan Gives Good Results

My practice has been to alternate these slant driveholes with the 6-in. square hitches cut in the two ribs, which I believe gives better results in putting up the bars. Should the coal be a little soft immediately under one end of a bar, a hitch can be cut lower down in the coal and a short leg inserted to hold that end of the bar.

Not only will steel crossbars last during the life of the mine, but they are able to withstand a greater side pressure than wood bars. This method of timbering gives a good clear roadway and avoids the risk of timbers being knocked out when cars are derailed.

Sullivan, Ind. R. J. PICKETT.

IN DESCRIBING the retimbering of an old slope an inquirer some time since stated that the coal was overlaid with a frail soapstone roof that had fallen to a considerable height above the road. The thickness of the soapstone in that instance was not given. Sometimes, where the thickness of such material is not great, it may prove an advantage to take it down up to the solid formation in order to secure a good roof that is safe for the men to work under.

A soapstone roof on a haulage road, moreover, will almost invariably prove a nuisance, as the dropping of the loose material on the roadbed requires constant cleaning of the track and demands care and watchfulness on the part of the driver or triprunner to avoid accidents. In addition to this, there is the expense of the wages paid to timbermen and the cost of the material required to keep the road safe and in condition for haulage.

It is probable that, in the case here mentioned, the thickness of the soapstone is too great to permit of its being taken down and the only thing to be done is to adopt the best and most economical method for the support of the roof. In no case should long legs be used for supporting the crossbars on a main haulage road. Instead, my preference has always been to support the bars in hitches cut into ribs on each side of the entry where the coal is sufficiently hard.

Short Legs Hitched into Ribs Safe Practice

Every one familiar with mining practice knows that the derailment of cars is a matter of frequent occurrence in the haulage of coal underground; and timbers are almost sure to be knocked out when long legs are used. Even though this may not happen, the breaking of a coupling or cable may let one or more cars run down the slope with the same result. In that case, it is fortunate indeed if several sets of timbers are not torn out.

In many cases, the roof will be left in such a dangerous condition that nothing can be done to replace a derailed car on the track, until the roof is first made safe. In closing, let me say, by all means avoid the use of long legs when timbering a haulage road. Instead, hitch the crossbars into the ribs, as I have stated. At times, a short leg can be used hitched into the coal on one or on both sides of the entry. WILLIAM ALLAN.

Frontier, Wyo.

Mine Cave-in Depicted in a Moving Picture

Mining conditions and scenes not always successfully featured in a moving picture—Such attempts should be made under the supervision of mining men to appear realistic.

A SHORT time ago, through the columns of *Coal Age*, I commented on the incorrect featuring of a gas explosion, which was assumed to have occurred in a bituminous coal mine. In that instance, the picture shown on the screen was called "The Flame of Life," which probably appealed to the producer as an appropriate title for a picture depicting an explosion of gas in a mine.

Only recently another film has been unreeled in a somewhat more successful attempt to bring before the popular gaze the scenes of a cave-in at an anthracite mine. This picture is entitled, "The Little Church Around the Corner," perhaps suggested by the fact that the story included a parson who assisted in the work of rescue following the disaster.

It is not my purpose to unnecessarily criticize the featuring of mining scenes and occurrences; but I want to say that these scenes would be far more realistic, if those in charge of the production had enlisted the

advice and assistance of coal mining men familiar with every detail and whose suggestions and assistance would add life to the picture.

In this second attempt to portray life in the mines, the story briefly told is that of a colliery owner who had persistently turned a deaf ear to the entreaties and warnings of the workers employed in the mine. They had protested that parts of the underground workings were unsafe. The development of the story showed that the inevitable happened with the result that a number of men were entrapped by a heavy roof fall that cut off their escape to the surface.

RESCUERS WEAR OLD TYPE OF HELMET

Among the rescuers was a parson, the thought of the producer probably being that his presence lent an added interest to the scene. While the rescuers were very properly equipped with flame safety lamps and carried a caged canary to betray the presence of poisonous gases, they all wore the old type of helmet, which is now no longer used in exploring mine workings.

However, finding that the canary was unaffected by any gas present, the rescuers promptly discarded their helmets and set to work to remove the fall behind which they hoped to find the men still alive. Happily, after much hard work, the rescuers broke through and the entrapped men were saved, though a few of them showed signs of being overcome for lack of air.

As I have intimated, the worst feature of this film production was the wearing of the old type of helmet by the rescuers. Also, the caving in of the underground workings was announced in the picture by a puff of white smoke that came from the mouth of the shaft and was supposed to represent dust; though a dense black cloud would have better described the occurrence. To the credit of the producer, it can be said, however, that the crowd of miners and their people appeared natural and a large coal breaker was filmed continually.

Pittsburgh, Pa. M. W. VON BERNEWITZ.

Longest Mine-Drainage Tunnel

Cripple Creek drainage tunnel not the longest—Surpassed in length by the Jeddo mine-drainage tunnel and branch, aggregating five miles in length.

REFERRING to the account of the Cripple Creek drainage tunnel, *Coal Age*, June 14, p. 980, given in response to an inquiry asking for the longest tunnel driven for drainage in mining districts and its location, it will be of interest to readers to know that the Jeddo drainage tunnel, in Luzerne County, Pa., is probably the longest tunnel driven for the drainage of mines in this country.

The Jeddo tunnel, known as the A. G. Markle & Co. project, was driven in 1893-1895 and extends from Little Nescopeck Creek to the valley of Big Black Creek, a distance of approximately 3½ miles. From this main tunnel there was driven a lateral tunnel or branch extending 1½ miles to the east. The main tunnel was driven 8x8 ft., in section for a certain distance and the balance of the way the section was changed to 7x11 ft. The length of the Cripple Creek drainage tunnel is stated as about 10,000 ft., or somewhat less than 2 miles, while the Jeddo drainage tunnel, together with its branch, aggregates 5 miles in length. As far as we know, this is the longest mine-drainage tunnel in the country.

C. J. CREVELING, Gen. Supt.,
Blackwood, Va. Blackwood Coal & Coke Co.

Inquiries Of General Interest

Ascertaining Resistance Due to Bends in Airways

Recent Experiments Show Resistance of Sharp Bends Is Considerable—Loss in Static Pressure Measured by Modified Pitot Tube

MUCH has been said, lately, about the amount of the resistance offered by bends and angles in mine airways, and I have wondered how such resistance affects the coefficient of friction. Is the resistance due to a bend in an airway sufficient to have any appreciable effect on the power producing the circulation? Also, is the coefficient of friction the same in an airway having a number of sharp bends as in an airway that is straight, other things being equal? Kindly explain if there is any practical way of finding the amount of resistance offered by a sharp bend or angle, in an airway, and state how this is done.

Marissa, Ill. GEORGE HOLMAN.

For some time past, the Engineering Department of the University of Illinois, in co-operation with the Federal Bureau of Mines, has been investigating what effect sharp bends and changes in the sectional area of airways, together with the form of timbering and other irregularities, may have on the actual pressure producing the circulation of air in those airways.

It has long been known that such obstructions to the flow of air, as those just mentioned, have more or less effect to increase the pressure required to circulate the air. It is only recently, however, that attempts have been made to measure the effect and determine to what extent the mine resistance is increased.

It will be readily understood that, in order to make these determinations of any value, it was necessary to employ special devices that would enable accurate measurements to be taken of the pressure on the air, before and after the current had passed the bend or other obstructions. The apparatus used for this purpose has been fully described in the issue of *Coal Age* for April 26, 1923, pages 669-674.

As there appears, use was made of small pressure boxes, airtight except for two small holes bored in each of the flat sides of the box for the purpose of registering the static pressure in the airway at the point where the box was placed. An airtight tube connected each pressure box with a special gage by which the pressure could be read to 0.001 inch.

In taking the observations at a sharp bend in the airway, two pressure boxes were placed, one outby and the other inby of the bend, and each box was connected by a rubber tube with the special gage for registering the respective pressures in the boxes. The difference in these pressures showed the loss of pressure due to the bend. When an airway makes a square turn of 90 deg., the theoretical loss in pressure is twice the velocity head, as calculated by the expression v^2/g. On the other hand, if the same turn through 90 deg. is made by a gradual curve the loss is almost inappreciable.

By way of illustration, suppose an air current having a velocity of 1,200 ft. per min., (20 ft. per sec.) strikes a sharp right-angle turn in the airway, the loss in pressure, expressed in inches of water gage, is 0.18 in. Assuming the mine is ventilated under a 2-in. water gage in the fan drift, such a right-angle turn in an aircourse would mean a loss of $(0.18 \times 100) \div 2 = 9$ per cent of the pressure or the power producing the circulation. This is a very considerable loss and shows the importance of avoiding such sharp bends in an aircourse.

In regard to its effect on the coefficient of friction for the entire mine, no definite answer can be given to this question, as each obstruction is a debit item separate from the frictional resistance offered by the rubbing surface. For this reason, it cannot be understood to affect the coefficient of friction as that is generally understood.

Examination Questions Answered

Miscellaneous Questions

(Answered by Request)

QUESTION—*If a mine makes 312.5 gal. of water per minute and has a sump that can hold 20 hr. of water, while the steam pump has a capacity that can empty the sump in 15 hr. if the supply is cut off, how long will the pump be in taking out the water, the sump being full and the supply constant? What will be the dimensions of the pump?*

ANSWER—The capacity of the sump, in this case, is $20 \times 60 \times 312.5 = 375{,}000$ gal. A pump that can handle this quantity of water in 15 hr. must have a capacity of $375{,}000 \div (15 \times 60) = 416\frac{2}{3}$ gal per min. If the supply is constant the sump will be drained at the rate of $416\frac{2}{3} - 312\frac{1}{2} = 104\frac{1}{6}$ gal. per min. The time required to drain the sump, under these conditions, is $375{,}000 \div 104\frac{1}{6} = 3{,}600$ min., or 60 hr.

Then, assuming a piston speed of, say 100 ft. per min., the diameter of the water-end of a pump having a capacity of $416\frac{2}{3}$ gal. per min., is found by the formula.

$$d = 5.37\sqrt{\frac{G}{S}} = 5.37\sqrt{\frac{416\frac{2}{3}}{100}} = 10.96, \text{ say } 11 \text{ in.}$$

QUESTION—*The total pressure on a steam piston is 100 short tons. If the diameter of this piston is 24 in., what is the pressure of steam per square inch?*

ANSWER—The sectional area of a 24-in. piston is $0.7854 \times 24^2 = 452.39$ sq.in. For a total steam pressure of 100 short tons (200,000 lb.), the unit pressure of steam on the piston is $200{,}000 \div 452.39 = 442.1$ lb. per sq.in.

QUESTION—*How should a safety lamp be treated when found to be full of flame, as the result of being in an explosive mixture?*

ANSWER—Make no quick movement, but slowly and promptly lower the lamp toward the floor or remove it from the body of gas. In withdrawing from the place, screen the lamp as much as possible by hiding it under the coat.

QUESTION—*We are using 2-in. pipes leading to nine sumps. We are going to gather our water into one sump and want to use one pipe to do the work. What size of pipe will be necessary to replace the nine 2-in. pipes?*

ANSWER—Disregarding the possible unequal lengths of the pipes and assuming an equal head and length in every case, the quantity of flow varies as the square root of the fifth power of the diameter of the pipe. In other words, for the same head and length of pipe, the diameter ratio is equal to the fifth root of the square of the quantity ratio. But, in this case, the flow in the single larger pipe must be nine times that in a single 2-in. pipe. Then, calling the required diameter x. the quantity ratio being 9, we have

$$x = 2\sqrt[5]{81} = 2 \times 2.4 = 4.8, \text{ say } 5 \text{ in.} \qquad \sqrt[5]{9^2} = 2$$

QUESTION—*(a) What are the advantages of high piston speed? (b) What are the disadvantages of high piston speed? (c) What is the effect of high piston speed on the rod packing?*

ANSWER—(a) The advantage of high piston speed is the obtaining of greater power with a reduced space occupied by the engine.

(b) The disadvantage of high piston speed is the difficulty to properly balance the engine and avoid the racking strain on the movable parts, particularly the crank connections.

(c) The effect of high piston speed on the rod packing is to produce a greater wear on the packing, which will require more frequent renewals. This is owing to the greater distance of rod travel in the same time, and the packing sweeping over a larger area in that time, than with a lower piston speed.

QUESTION—*What in your opinion is the best kind of boiler for use in coal mines, and why?*

ANSWER—More recent coal-mining practice is to replace the return tubular boiler, formerly so largely used in coal-mining districts, by the safer and more economical water-tube boilers.

QUESTION—*How may the water consumption of a boiler be calculated?*

ANSWER—The evaporative power of a boiler depends on a number of things, such as the type of boiler employed, amount of heating surface, area of grate and whether forced or natural draft is used. Knowing the rated horsepower of the boiler, its water consumption may be found by multiplying the rated horsepower by 34.5 and dividing that result by the factor of evaporation, which must be taken from a table of feed-water temperatures and boiler pressures.

QUESTION—*How can you prove the correctness of the steam gage and safety valve, on a boiler, by comparing them with each other?*

ANSWER—First calculate the pressure on the valve at which the steam will start to blow off. To find this pressure, multiply the weight of the ball by its distance from the fulcrum of the lever and divide that product by the distance of the valve stem from the fulcrum, both of these distances being expressed in inches. The result will be the total pressure of the steam on the valve that will cause it to lift. Then, dividing this total pressure by the sectional area of the valve, expressed in square inches, will give the steam pressure, in pounds per square inch. This pressure should correspond to the reading of the steam gage, if both the gage and the safety valve are in good working order.

Mine Inspectors' Institute Advances Cause of Safety

Wants All Electrical Equipment Better Protected—Discusses New Guards Against Explosions—Decides to Revivify—Resents Bureau of Mines Interference

By E. W. Davidson

Withering heat at Pittsburg, Kan., did not prevent the Mine Inspectors' Institute of America from making a little Institute history July 10 to 12. It stuck strictly to business for the entire three days of its fourteenth annual convention, engaged in some spark-striking discussion, developed several safety measures that may save lives and property, asserted itself for state's rights in the face of a Bureau of Mines gesture of domination, and started in vigorously to revive its own self to virility. It elected James Sherwood president and chose Cincinnati, Ohio, for its meeting place next year.

All of this action was taken in spite not only of consuming heat, which is well worth two mentions, but also despite the fact that the attendance was the smallest the institute ever had. The very thinness of the ranks stung the institute to action. "We've got to revive or quit," declared President Robert M. Lambie. The decision was to revive, and do it right away. So the constitution was rewritten to open the membership not only to all coal- and metal-mine inspectors of America but to every man engaged in mine safety work, whether for an insurance company or a mining concern, and to every man who professionally teaches mine safety. It set up a committee to lay out a plan for organizing district chapters to awaken interest and stimulate more safety thought, and will hereafter urge every Governor and every company to send inspectors and safety men to future meetings.

The bars were not lowered too far, however. Men declared with much candor that the institute is not to "degenerate into a thing run by grease and powder salesmen to drum up business." The institute's head is high and its aim is straight at a goal—making mines safe.

Much sound safety talk during the convention is expected to crystallize into safer practices in mines everywhere but the most concrete work of the convention displays itself in the main resolutions, which, summarized, follow:

(1) That every possible effort be made to safeguard the use of electricity in mine operations and to this end we would request the U. S. Bureau of Mines to make every possible effort to discover means whereby electrical equipment in mines will be made as safe as possible and that special attention be given to the proper installation and care of the electrical transmission lines in mines.

(2) That, whereas, in the July 5, 1923, issue of *Coal Age* reference is made to proposed safety inspections of mines by engineers from the mine-rescue cars of the U. S. Bureau of Mines, reports of such mine safety inspections to be made directly to the operator. Be it resolved that it is the sense of this meeting of the Mine Inspectors' Institute of America that such inspections, though undoubtedly made with the best of intentions, will seriously embarrass the state mine inspectors in their work unless the Chief Mine Inspector is notified so that he may arrange to make a joint inspection at the same time.

(3) That the chiefs of the various state departments of mines be requested to join together for the purpose of preparing uniform mining laws and that the governors of the various mining states be requested to send the various chiefs to a meeting called by the president of the Mine Inspectors' Institute of America for the purpose of preparing such uniform laws and to include the necessary funds for such revision in their various budgets.

(4) That the secretary write to all operators' associations at least sixty days before each meeting of the institute requesting them to send their men engaged in safety promotion work and use their influence to get governors to send state inspectors and that similar letters be sent to the officials of liability insurance companies carrying mining risks and to the director of the Bureau of Mines.

(5) That every state should extend safety inspection to cover every hazardous type of mining.

(6) That, since it has been brought to the attention of the institute that in one of the important coal fields, water is being applied by means of a pipe fitted to the cutter heads of mining machines, thereby eliminating the dangers arising from coal dust at the working face, it was resolved that the institute go on record as favoring the application of water wherever practicably possible, and further that "we believe the application of water during the operation of cutting is a safe, practicable method for the elimination of dangers of coal dust at the face of rooms and entries."

The full list of new officers chosen at the wind-up of the convention is: President, James Sherwood, of Kansas; First Vice-President, James Dalrymple, of Colorado; Second Vice-President, Frank Hillman, of Alabama; Third Vice-President, E. J. Hoey, of Illinois; Secretary, Martin Bolt, of Illinois; Assistant Secretary, J. S. Rogers, of Kansas; Treasurer, Dr. J. J. Rutledge, of Maryland; Editor-in-chief, James T. Beard, of New York.

"A miner can't be a safe miner until he knows how and until the idea of intelligent caution is drilled into him as a second nature," the inspectors agreed. So the various educational movements throughout the country must be supported heartily and they must be expanded to cover the country. President Lambie remarked on this early in the session, saying that education is absolutely essential to safety and ought to be so recognized everywhere. In West Virginia the state classes for miners have already instructed 1,200 men of whom 800 have graduated. Summer school now has 87 getting safety training with technical mining instruction.

"Of course there is opposition among certain miners who fear they will be surpassed by men who take the courses," he said, "but the work should be done in spite of that."

Both Professors Yates and Abernathy, of the mining department at the Kansas State Teachers College, in Pittsburg, told of their own efforts to get more men from around Pittsburg into the special courses for miners and of their desire to expand the service of the school.

Pennsylvania is establishing evening schools for miners and the Department of Mines is taking an active interest in it, according to Joseph J. Walsh, secretary, in a letter to the convention. He said the courses are comprehensive but simple. It is expected that 10,000 mine workers will attend classes during the coming winter months. "These," said Mr. Walsh, "will be a potent factor in the intelligent operation of mines.

Efforts for Safety and Education

"The Department is co-operating with anthracite operators and mine workers to devote two weeks to a safety and educational period," he wrote. "During the first week the mine officials will devote a greater part of their time to instructing their employees in everything that pertains to safety, giving particular attention to the new and unskilled miners. The first day probably will be devoted to instruction and advice regarding shaft accidents, the second day to accidents by falls, and so on. The second week will be a sort of general safety week, a program for which will be worked out by the operators. A similar program will be carried out in the bituminous region in a short time."

The inspectors said a good many pointed things about the dangers of electrical machinery in mines.

The old, old question of what to do about dust got wide-awake attention. Martin Bolt said dust always is so dangerous that there is not much use trying to determine how much there must be present to constitute a hazard. After each shot "bug dust" should be carefully loaded out and the place wet down before another shot is fired. Also adjacent places ought to be wet down well. But the trouble is a pile of dust cannot be rendered innocuous by sprinkling casually, for it will ride on top of the water. Loose coal dropped from cars should not merely be shoveled aside in haulageways, he thinks, for it so often rolls back on the tracks or under a mule's hoofs and is ground to dangerous dust.

The plight of the oil-harrassed coal fields around Pittsburg, Kan., was pictured to the convention at its Wednesday morning session by W. L. A. Johnson, commissioner for the Southwestern Interstate Coal Operators' Association. He said the output of Kansas, Oklahoma, Missouri,

Arkansas, Iowa and Texas was 30,000,000 tons a year in war time, but in 1922 it dropped to 5,500,000 tons and this year it would be about the same. He is doubtful whether coal can continue as an industry there unless a separate and lower wage scale can be obtained.

He believes in most careful coal-mine inspection by state inspectors but he hoped such men would not get overzealous to the point of compelling operators in such a stricken field as the Southwest to take extreme and unnecessary safety precautions which are expensive. He urged that they always temper authority with judgment.

Failure of union labor to co-operate with operators to make safety methods and devices successful blocks many commendable efforts by mine inspectors, he said. Then he cited the instance of the mine in which shotfiring devices were put. Miners insisted they be compensated whenever the new method failed to fire. Because a miner who wanted a full day at home with pay could so easily have cut a wire or otherwise caused his place to remain unshot, the operators refused the demand. The men struck six weeks at that mine against the life-saving shotfiring device and finally won. There is no telling how many lives have been wasted since the old method was reinstated.

Operators' efforts have helped materially to reduce accidents in West Virginia, retiring President Lambie told the convention. He cited the safety methods of such companies as the Davis Coal & Coke Co., the Consolidation Coal Co. and the United States Coal & Coke Co., winding up with statistics showing that although 394 men were killed out of 95,883 mining in the state in 1917, in 1920 the ratio was only 346 out of 124,576, which proves that fatal accidents are decreasing steadily. Mr. Lambie's report to the convention will appear later in *Coal Age* in more detail.

Lambie Decries Bureau's Safety Advice

The solid objection of the inspectors was registered against the recently announced plan of the Bureau of Mines to have its field men make safety recommendations direct to mine operators.

"It's an interference with states' rights," declared President Lambie. "The Bureau was created for research and scientific work and that alone. I have had much aid from it and I intend always to co-operate with it heartily, but this new rule is a first step toward nationalization, and I for one think the time to stop it is right now, before it grows."

Inspector Dalrymple of Colorado and others also took a stand with Mr. Lambie. There was much reminiscing of the days years ago when the bureau antagonized many state inspectors, especially in West Virginia and Colorado. It was suggested that the bureau "family" is not united for it, as evidenced by a statement definitely against it sent to the convention by J. W. Paul, chief engineer of the bureau, the retiring secretary of the institute. The general feeling, after the air had cleared, was that the bureau may be expected soon to recall the new order. However, the resolutions committee brought in a resolution condemning it.

Vigorous discussion followed on the introduction of the question, What effect does accident compensation have on accidents? Most of those present could not see where it had helped to reduce them. Chief Inspector Sherwood, of Kansas, advocated uniform laws in all states and an examination of all would-be miners with certification. Dr. Rutledge in brief sketched the good work done by the Bureau of Mines since its establishment.

Wednesday afternoon the institute motored around the Pittsburg mining region. That evening at a dinner given by the Chamber of Commerce of Pittsburg, nearly everybody spoke. C. F. Spender, head of the Pittsburg & Midway Coal Mining Co., introduced the orators all the way down the line from F. W. Newman, president of the chamber, and President Lambie, of the institute, clear to the end of the table, where sat Frank Hillman, whom Lambie calls the "sheik of Alabam," always prolific of ideas and graceful phrases. Inspector Sullivan, of West Virginia, made a plea for better feeling between operators—"who form associations to protect themselves against each other"—and miners prone to suspect their employers. The two do not understand each other and never will until they honestly try to put friendliness into their business relations, he said.

Others who spoke were Martin Bolt, Dr. Rutledge, Professor Yates of the Pittsburg Teachers College, and Mr. Ryan.

At the opening of the Thursday session, Acting Secretary Sullivan announced that sixteen new members had been received. J. E. Roberts, chief inspector of Missouri, and Frank G. Fenix, a zinc-mine inspector from that state, spoke briefly. Tolbert Henson, a Missouri lead-mine inspector, precipitated a discussion when he suggested the institute send a resolution to the Governor of Missouri favoring a tonnage tax on iron and sand to support inspection of those operations. A number of inspectors objected to direct taxation or fees for inspection, holding it should be supported by general funds. Mr. Hillman said there would be too much tendency "to give Jones $2 worth of inspection if he pays that, and Smith $4 worth if that is his tax." Mr. Darymple, however, declared a direct tax is the only way that enough can be raised to properly support inspection. The decision of the institute was that it believed that inspection should be complete in all states wherever men work under hazardous conditions. The feeling was that the institute should not express itself in state matters.

A new discussion of uniformity of mine laws broke loose when the resolutions committee, composed of Dr. J. J. Rutledge, Frank Hillman and Martin Bolt, reported the resolutions previously mentioned. One of the proposed resolutions, favored a drafting of uniform laws for all states, especially for coal mining, by a conference of state chief inspectors. Mr. Dalrymple said it was an impossibly big job besides raising too many delicate questions between states. He was for dropping the matter, at least until the U. S. Coal Commission reports. The Commission has made a considerable study of the matter.

However there was a good deal of insistence that a uniform method of reporting accidents be perfected and that the institute do its best to get such forms adopted. Mr. Sullivan wanted it done so as to aid the Bureau of Mines in compiling statistics and reporting them to the public. Mr. Bolt remarked that the bureau asks from states only the number and causes of accidents and that not much uniformity is needel for that. He doubted whether inspectors' reports to state departments could be made uniform because of the wide variation in conditions between states. Mr. Dalrymple added that it is impossible to draw up this year a uniform blank covering everything that may develop next. Therefore there must always be room for "other conditions," such as is provided in Colorado blanks.

Before the institute passed its resolution urging that electrical equipment in mines be made safer Mr. Dalrymple campaigned to get the inspectors declare they would sanction the use of no electrical equipment whatever that did not bear the Bureau of Mines plate. But Dr. Rutledge, Mr. Hillman and others insisted that such a thing would put so much work on the bureau that it could not be done. The electrical section now approves only machines and switches.

"It can be done," declared Mr. Dalrymple, "and some day it will be done. The sooner we start, the quicker we'll reach that time. I want this institute to show the bureau and the world that it is behind the bureau to the fullest extent, and this would be one way to back it up in a great work."

Mr. Bolt and others counselled that the bureau merely be urged to study and bring out the weaknesses of electrical equipment, believing the manufacturers will voluntarily make many important remedies. Then the resolution, much tempered from the original proposal, was adopted.

Near the close of the convention a message of greeting was sent to J. W. Paul, retiring from the secretaryship after a service of fourteen years from the organization of the institute, conveying to him the institute's good will. Another went to J. T. Beard, Associate Editor of *Coal Age*, whose effort to resign from the editorship of the institute was fruitless.

Then a committee composed of E. J. Hoey (chairman), James Dalrymple and R. M. Lambie was appointed to work out a method of organizing district chapters of the institute and report at the next meeting in Cincinnati, Ohio, the second Tuesday in May, 1924. Points brought out in the discussions will be given in more detail in *Coal Age* next week.

Commerce Commission Orders Investigation Of Anthracite Rates

Apparently the Interstate Commerce Commission is disposed to go to the full limit of its powers to assist in stabilizing the coal industry. This is indicated by the prompt action it took in ordering an investigation of anthracite freight rates. The order was issued the day following the appearance of the report of the U. S. Coal Commission, in which such a recommendation was made.

There are some who believe that the decision in the assigned-car case was expedited by the Commerce Commission before the Coal Commission could have any opportunity to lay the responsibility at its door for the evils growing out of a practice which the Commerce Commission had approved.

The carriers have made formal application to the Commerce Commission for a rehearing in the assigned-car case. This follows a meeting of railroad executives in Washington on July 10, at which it was decided to take that action. If the Commerce Commission does not believe a rehearing justified, it is asked to allow the carriers to present additional arguments. In case that request is not granted, the carriers then suggest that the Commerce Commission give further attention to the situation of carriers purchasing for substantial periods the total output of mines and the situation of carriers owning their own mines and using the output thereof solely for railroad fuel.

This action on the part of the carriers is characterized in some quarters as being puerile. Attorneys for the carriers sat through the hearings, and because they regarded it as good tactics they made no defense of their position. They played poker, as one traffic man puts it; took a chance and lost. They did not expect to lose, so now they come back and want to put into the record what they deliberately left out for strategic reasons.

While all of the carriers will be a party to action on the part of the American Railroad Association, it is understood to have been the attitude of the Pennsylvania company that it would have been better to try out a plan of fueling without resort to the assigned car. Certain of the lines, it is understood, already have promulgated rules in conformity with the assigned-car decision.

Anthracite Wage Conference in Abeyance; 35 Demands Made, Says Warriner

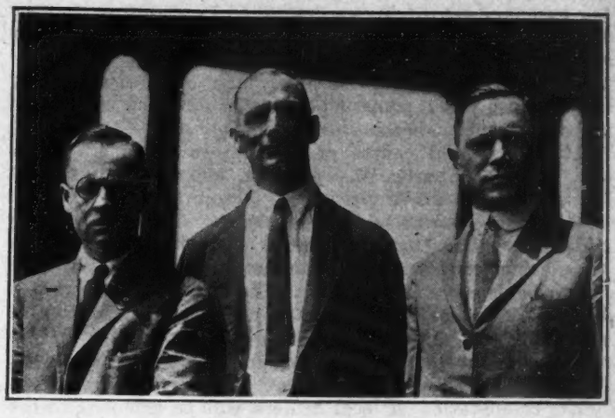
Negotiations at Atlantic City between the anthracite mine workers and operators was suspended this week while the representatives of the miners attend the convention of District No. 1 at Wilkes-Barre and the installation as district president of Rinaldo Cappelini, who defeated William Brennan in the June election.

Several conferences were held last week by the sub-committee of eight that is considering the miners' demands. So far the miners have refused to consider an agreement binding them to remain at work after Sept. 1 if a new contract is not written in the meantime. Miners are forcing to the front their demand for the check-off. On July 10 Mr. Warriner issued the following statement:

"The position of the anthracite operators with regard to the wage negotiations is this:

"Actually the miners have presented thirty-five demands for changes in wages and working conditions, and not eleven, as would at first glance appear. Many of these demands involve the consideration of economic and technical details which will consume considerable time.

"Past experience has demonstrated that an anthracite wage contract cannot be negotiated in a hurry. While there is no disposition on the part of the operators to prolong unduly the negotiations, our action in appointing two alternate members of the subcommittee in order that there may be uninterrupted discussions is an indication of our anxiety to complete the work at the earliest possible moment. We realize that there is a possibility that a new contract may not be completed before the present one expires on Aug. 31. It must be borne in mind that only about seven weeks intervene between now and the end of August.



MINE WORKERS' REPRESENTATIVES ON ANTHRACITE SCALE COMMITTEE

Left to right: Thomas Kennedy, president of District 7, Hazleton; C. J. Golden, president of District 9, Shamokin; William Brennan, retiring president of District 1, Scranton, who was defeated for re-election by Rinaldo Cappelini.

"It was with all of the facts in mind that the operators both in the meeting of the full joint scale committee yesterday and in subcommittee today sought to obtain from the miners an agreement that there should be no suspension of mining operations after Aug. 31 in case the wage negotiations extend beyond that date. We proposed such an agreement for the main purpose of allaying public apprehension of a recurrence of the lamentable conditions of last winter."

The mine workers were somewhat taken back on July 1° when they were cross-examined by the operators on the sub-committee about the working of the check-off. They were asked to state specifically the wording of the contract clause to apply it in the anthracite region and to relate how it worked in the soft-coal fields. The miners replied, it is reported, that they would propose the standard clause that is being used in the soft-coal contracts, which they said had been "eminently satisfactory to both parties."

Adjournment was taken at midnight on June 12 until June 23 at Atlantic City.

Mine Bureau Engineers on Tour by Truck to Test Anthracite from New England Yards

In order to discover the amount of ash in anthracite as actually delivered to the consumer, the U. S. Bureau of Mines has sent into the field two engineers with a truck arranged for reducing coal samples which will be labeled and analyzed at the Pittsburgh testing station of the bureau. Results of these tests will be published by the bureau at the end of the season, which will be when cold weather arrives. Neither the names of the dealers from whom the samples are obtained nor the names of the shipping mines will be published, but the report will make known the towns in which the samples were obtained, the type of coal and the results of the analyses.

This move represents the first effort to obtain definite data regarding the qualities of coal delivered to consumers. Tests have been made, and still are made, of coal, both anthracite and bituminous, delivered to governmental departments in Washington, and last winter, under instructions of the Senate, the Bureau of Mines conducted tests of anthracite from the yards of retail dealers in Washington, but these tests did not afford the opportunity to obtain a cross-section view of the subject such as may be obtained by itinerate sampling.

In all the talk in recent months about "dirty coal" there has been what is described as a "surprising" lack of definite figures either as to the amount of ash that is and to be expected or the amount that is actually contained in coal which is complained of as "too dirty for use."

Officials of the Bureau of Mines long have had in mind plans to send engineers into the field to discover definite information regarding coal quality as the fuel is delivered to the consumers. O. P. Hood, chief mechanical engineer of

the bureau, planned his estimates of expenditures for the fiscal year 1924 to include some work along this line, these estimates were approved by the director and the appropriation passed by Congress last winter included a sum for this purpose which made it possible to start the work when the appropriation became available July 1.

After a special course of training in Washington, the two engineers, Charles W. Jeffers, Jr., and George R. Cooley, left July 9 and drove directly to Boston.

Massachusetts was selected for the first tests some months ago and the fact that the work is being inaugurated there has no connection with the enactment of an "unfit coal" law by the Legislature of that state. The tests will be conducted from the national standpoint and while the co-operation of state and local authorities will be welcomed, there will be no connection between the tests conducted by the Bureau of Mines and any other tests.

The co-operation of local dealers will be essential to the success of the tests in any locality. The tests will be thorough, according to the standards of the Bureau of Mines and of the American Society for Testing Materials. Donation of 1,000 lb. of anthracite will be necessary for each test. Preferably, samples will be taken from coal being loaded for actual delivery. The samples will be crushed in the machine carried in the truck for that purpose, and a quantity of the crushed material will be sealed in a can and sent to the Pittsburgh station for analysis.

If the work in Massachusetts is concluded before cold weather arrives, the engineers will go into Connecticut, and thence, if time permits, into other New England states.

There have been numerous requests to the Bureau of Mines for similar tests of bituminous coal, in other sections of the country, but the appropriation available is so small that only the one truck could be sent out and work in the anthracite-consuming region was decided upon first.

There is no official standard of the percentage of ash permissible in anthracite. By tacit understanding in the industry, product with less than 40 per cent ash is considered coal, that with 40 to 60 per cent ash is described as bone and that with from 60 to 100 per cent ash is described as slate. Tolerances in sizes make it difficult to calculate without a test the exact ash content of a shipment of a given class of anthracite.

Coal Commission Anthracite Report Elicits Little Enthusiasm in Middle West

It cannot be honestly said that the U. S. Coal Commission's anthracite report caused any great satisfaction among Midwestern operators. As a matter of fact it did not even stir up lively interest. There was general approval of the commission's stand against nationalism but the commonest comment was that the report contained "no kick," and that while the Commission's intentions evidently were good, it devoted a good deal of space to things said for political effect and did not bring out much that is new.

In Chicago it is often remarked that the Commission's proposal that costs and profits be made public by some governmental agency may not mean much because it would be so easy for unscrupulous operators to juggle their figures. Also it would be easy for the governmental agency to misrepresent and misconstrue coal statistics. Nobody takes very seriously the suggestion that the President take over mines and operate them in case of impending strikes. They hark back to the parlous days of last year when the President threatened to do that very thing only to recede from his stern position, and wonder by what specific plan the Commission would empower him to do it in the next emergency.

The feeling among St. Louis operators is not different from that in Chicago. There is not enough of practical benefit in the report and too much said for political effect. There are smiles over the proposal that the President operate mines to prevent coal stoppage by strike. The President must have more authority than he has now to do that with any effect. Also there is disapproval of the plan to collect and compile figures on coal costs, not because the average St. Louis operator fears to reveal the truth about the coal industry where such revelations may benefit the industry but because there is too great a likelihood of those statistics falling into unfair and unintelligent hands.

One prominent operator, however, sees, besides the Commission's stand against nationalism of the mines, one other outstanding virtue in the anthracite report. That is the obvious desire on the Commission's part to set the public right on the matter of profits. The report's mention of 12c. on the dollar divided between producer and seller, instead of the "fabulous" profits usually credited to "coal barons" in the public mind, is having a good moral effect, this operator thinks. His belief in the good intention of the Commission on this point is supported, he says, by the Commission's latest request to bituminous operators for exhaustive statistics on revenue and coal profits since 1913. The truth about the lean years between 1913 and the present will prove that in the long run the coal operator makes no great profit. The average investigators are never fair enough to allow so long a view to be taken but make their decision on high years, when the operator is recouping previous losses.

In the Southwest operators have little to say about the anthracite report. The general feeling of hopelessness in that oil-stricken field is that although the Commission's recommendations for anthracite if applied to bituminous would not promise much benefit, yet anything might be better than present conditions.

The keenest interest a Rocky Mountain coal company official took was in the Commission's remarks about labor. Said he: "I certainly hope the Commission soon backs up its belief in labor living up to contracts by proposing something effective to bring this about. Of course, incorporation of unions would help, but probably something else is necessary." He was hopeful that the Commission had a "something else."

Mines of Crow's Nest Pass Work Under Handicaps, Says Coal Company Head

There is more discouragement than usual among the coal operators in the Crow's Nest Pass district of Canada, judging by remarks made by W. R. Wilson, president of the Crow's Nest Pass Coal Co., in his report at the annual company meeting in June. High wages, which were continued for one year after the strike, and "correspondingly high cost of production is creating a new set of adverse and discouraging conditions for this district in particular," said he, "for through the high cost of coal the railroads upon which this company in particular largely depended for the economic continuity, are displacing coal by oil, after patiently waiting for two years to see coal prices return to normal. In addition to this, smelters are prevented from accepting the lower grade ores because of the abnormally high prices of coke due to the high wages.

"When wages are increased in this district, the cost of production becomes magnified over and above the cost in fields operating under more favorable physical conditions, such as greater uniformity of structural coal bedding, better overlapping roof and greater freedom from dangerous gas generation."

Utilities Consume 2,943,242 Tons of Coal in May; Slight Gain in Power Produced

Electric public-utility plants consumed 2,943,242 net tons of coal during May, according to a report just issued by the U. S. Geological Survey. This compares with 2,967,707 tons consumed during April, according to corrected returns.

Fuel oil consumed by public-utility plants in May totaled 999,705 barrels, compared with 980,684 barrels in April. The average daily production of electricity by public-utility power plants during May was 149,400,000 kw.-hr., a slight increase over the rate for April.

The average daily production of electricity for the first five months of 1923 and the proportion produced by water power were as follows: January, 153,300,000 kw.-hr., 34 per cent; February, 154,400,000 kw.-hr., 33.9 per cent; March, 152,500,000 kw.-hr., 36.3 per cent; April, 149,100,000 kw.-hr., 39.9 per cent, and May, 149,400,000 kw.-hr., 41.1 per cent.

Emergency Federal Operation Feature of Anthracite Report Jars Operators and Mine Workers

By Paul Wooton
Washington Correspondent of *Coal Age*

The storm center of the anthracite report of the U. S. Coal Commission is the recommendation that the President be authorized to declare a national emergency in case of a deadlock between operators and mine workers and be empowered to take over operation of the mines and distribution and marketing of the product. The operators fear that this would prove to be nationalization's entering wedge. Labor objects to it because there at least would be the coercion of public opinion brought to bear to make men work aganst their will. The public, however, seems to regard the measure with favor, not that it is anxious to see the government undertake any business activity but because it believes the industry will avoid any invoking of the emergency powers and with that alternative hanging over them will reach an agreement.

The recommendation of the Coal Commission in regard to emergency powers simply brings to the fore one of the big issues in our national life, it is pointed out. It has been recognized with increasing appreciation that some means must be found to break a deadlock between employer and employee when the continuance of that deadlock seriously affects the public welfare. The fact that the Coal Commission has made a concrete suggestion for the handling of such a situation insures the consideration of that and alternate plans at the forthcoming session of Congress.

The fact that the Commission has endorsed, in effect, a combination of big business interests, under suitable regulation, throws into the congressional arena another highly controverted problem of our industrial life. It has been popular in Congress for many years to lambaste any large business enterprise on the assumption that being big is *prima facie* evidence of its predatory character. Opinion, even in Congress, is changing to the point where the efficiencies of big business and the various benefits to the public of combinations are becoming apparent. It is true that the Coal Commission admits the possibilities of unjustifiable profits on the part of the anthracite combination, but on the whole its report shows that it was not afraid to commend it despite the fact that it is big.

Commission Sees Malice in Daugherty Charge

The other outstanding feature of the situation is the furor created by the published statement that the Attorney General influenced the report of the Commission. Members of the Coal Commission denounce the statement as having been made out of whole cloth. No one acquainted with the Commission's membership would believe for a minute that they would brook any political interference with their findings. The difficulty is that there is a large number of persons within the coal industry more than anxious to believe the tale. In addition there is a portion of the public always willing to believe a story of sinister motive. It is admitted that the allegation has carried further than most untruthful statements. For that reason it will not be surprising if the Commission should take rather drastic and unusual methods to establish the untruthful and malicious character of this charge.

It just happens that there is clear-cut evidence to show that the Attorney General did not exert the influence attributed to him. To start with, Mr. Daugherty left Washington on June 22 and was not again in the Capital during the period prior to the issuance of the Coal Commission's report. The report itself was not written until July 4. The final revisions were not made until July 6. The cutting of the first stencils, and the only stencils of the report ever cut, was begun at 11 a.m. on July 4. No proofs were read by anyone other than members of the Commission, and then only on July 6. The stencils were completed and read at 10:30 p.m. on July 6. No stencils were destroyed prior to July 6. On that date it was necessary to recut two of them. In one case it was necessary to correct a bad typographical error and in the other there was a single verbal change which made it desirable to recut the sheet.

In some quarters the report of the Coal Commission is criticised for not having made clearer that there was no intention to reflect upon the integrity of the anthracite-producing companies in their comment on the limited natural monopoly. The fact that the nation's deposits of anthracite are limited is not chargeable to the operators. They would be subject to criticism had they combined to restrict output or to manipulate price, but the report makes no such charges.

Another criticism of the report is that the Commission sidestepped an important point when it stated that the determination of margins and profits is a judicial function. Before any definite conclusions can be drawn, it is contended, as to whether or not there has been profiteering, there must be a determination as to whether the properties are to be valued on their original cost, on the income-tax basis or on present value.

Government Should Know What Goes On

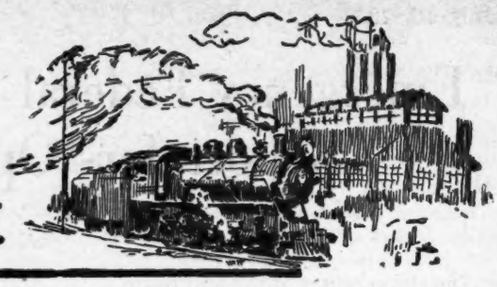
The report reveals that the Commission believes the public is entitled to sit as an observer in the affairs of business. It is something like the position of the administration toward European affairs. Mr. Harding does not believe the nation should accept any of the responsibilities of the reparations commission, but he has a decided opinion that the United States is entitled to know what the Commission is doing. The Coal Commission is determined in its belief that the government should stay out of the coal business, but it believes it should know what is going on in that industry.

There are some engaged in the coal business who believe it would show the proper spirit were the industry to subscribe to some such sentiment as this: "We accept the main idea of the report that the public, through the government, is entitled to know what we are doing. We are gratified to know that the public wants us to continue the conduct of this business. We think we can handle it better than anyone else. We agree with the Commission that we have a responsibility in providing uninterrupted service. We are going to furnish that service to the fullest extent that the United Mine Workers will let us."

The anthracite report brings out with great clearness the change in the public's attitude toward big business. For twenty years the majority apparently has favored the separation of business activities into as small units as possible with the idea of exciting the maximum amount of competition and has acted on the assumption that there is inherent danger in big business. Chief Justice Taft when President, took a determined stand against any such general condemnation. He pointed out that big business has a great capacity for public service. The Taft policy has been accentuated and put into practice by Mr. Hoover in his capacity as Secretary of Commerce.

In the meantime the public has had an opportunity to observe and form some conclusions of its own. Now comes the Coal Commission, believed to reflect the opinion of the majority, with an endorsement of big business provided a certain amount of harness can be used. It is the Commission's plan to call industry in and frankly put large responsibilities on it. Industry has shown that it is responsive to trust to a remarkable degree, whereas, humanly enough, it does not do so well when threatened and treated unfairly. All of the Commission's recommendations for changed conditions are along lines of industry's working out its own way of serving the public. Each time a choice was open to the Commission between accomplishing its purpose by an act of Congress or by voluntary co-operation within the industry, it chose the latter.

Production and the Market



Weekly Review

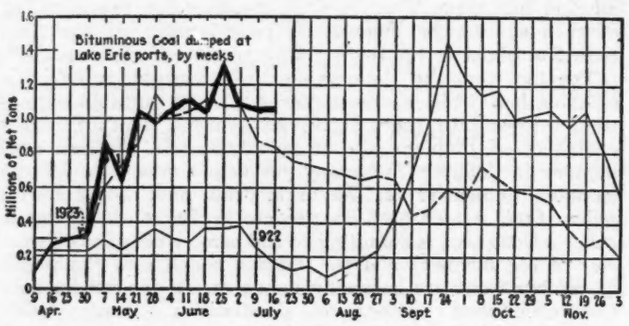
The mines are grinding out a steady flow of 10,500,000 tons of soft coal with little or no effort and around two million tons of hard coal a week with considerable effort. Buyers of hard coal—that is, the retail dealers and householders—are wondering why all this push and fervor of the "buy-your-coal-now" movement that is coming from Washington, when they can't get the coal they ordered six weeks ago. What the railroads and the officials at Washington are talking about, however, is soft coal, and what they are endeavoring to do is to get the country to take in during the summer months and put on the ground around their manufacturing plants and railroad yards a part of the soft coal that they will need next winter. The railroads say that they will be so busy hauling farm products next autumn that they will have to shove soft coal off the rails for a while and they do not want the operators to be crying "car shortage" at them as the price goes up. Buying of anthracite for household is ahead of production and this market needs no urging.

There has been a perceptible decline in soft-coal consumption following the slowing up of operations in iron and steel and textile industries. Railroads, public utilities and industries continue to add to their reserve stocks and there is much quiet buying of spot coal. Prices are fluctuating from week to week but on the average they are maintaining a fairly uniform level. *Coal Age* Index gained one point last week, an increase in the average price of 2c. per ton, raising the index to 198 on July 16. Of fourteen coals entering into this average, eight showed gains of from one to 13c.; and two dropped in price, while the remainder held firm.

Production on Rebound After Holidays

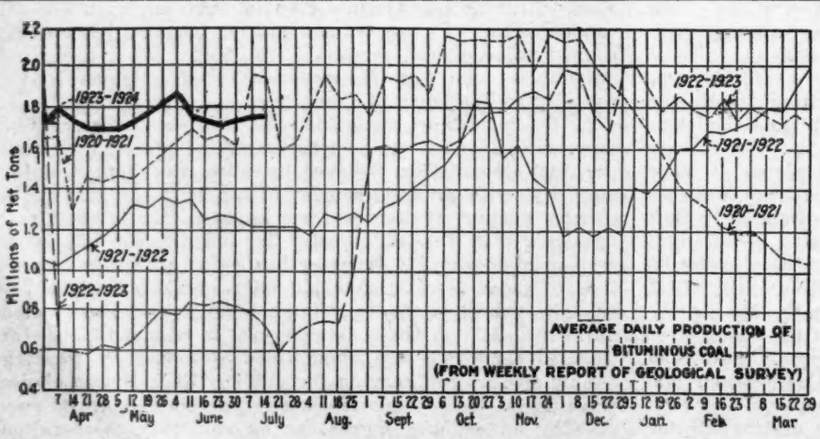
Production of bituminous coal during the week ended July 7 was affected by the holiday and the day following to such an extent that for the first time in several weeks it fell below 10,000,000 net tons. Estimates of the Geological Survey place total production for the week at 8,763,000 net tons, while early returns on car loadings for the present week indicate that the total output for the week will be in the neighborhood of 10,500,000 net tons. Anthracite production during the same week was about three-quarters of that for recent weeks. Revised estimates show that anthracite output during June was 8,665,000 net tons, which was exceeded only in the corresponding month of 1917 and 1918, which were years of large washery output. The cumulative output for the first six months of 1923 stands at 51,169,000 tons, larger than for any corresponding period of the last eight years.

Trading in the Middle West is slow. There is no demand and "no bills" seem to be the rule at nearly all mines. Along the Atlantic seaboard buying is slow.



There is no demand for spot coal but high-grade coals on contract are moving well. In New England stocks are large as compared with other seasons and buyers are hard to find.

The export market improved slightly last week. There were some inquiries for definite orders, most of the coal going to Dutch ports. A couple of inquiries also were reported from South American points. During the first week in July 60,655 tons of cargo and bunker coal left Baltimore, as compared with 93,846 tons in the last week in June.



Estimates of Production
(Net Tons)

	1922	1923
BITUMINOUS		
June 23	5,363,000	10,422,000
June 30 (*b*)	5,226,000	10,458,000
July 7 (*a*)	3,678,000	8,763,000
Daily average	736,000	1,753,000
Calendar year	191,528,000	282,035,000
Daily av. cal. year	1,201,000	1,774,000
ANTHRACITE		
June 23	24,000	2,042,000
June 30	25,000	2,105,000
July 7	23,000	1,580,000
Calendar year	23,348,000	52,749,000
COKE		
June 30 (*b*)	144,000	399,000
July 7 (*a*)	94,000	372,000
Calendar year	3,311,000	10,441,000

(*a*) Subject to revision. (*b*) Revised from last report

In some sections the movement of domestic sizes of anthracite is easier, but the demand continues strong. Consumers are watching developments in the anthracite situation and are urging deliveries from the retail dealers.

There were dumped for all accounts at Hampton Roads during the week ended July 12, 348,130 net tons of coal, as compared with 333,870 net tons during the previous week.

Chicago Market Is Low

Coal trading in the Chicago market remained low all week. So little domestic coal is moving out of any Illinois or Indiana field, however, that the ever recurrent hope that screenings would stiffen in price because of scarcity continued to be felt. However enough cheap screenings from Kentucky came into the Midwest market to prevent any noticeable price rise.

Stern efforts are being made by several smokeless shippers to prevent the recent 75c. cut made by one company on mine-run from spreading over the whole market. The result is that smokeless mine-run is selling all the way from $3 up to an occasional car at $4, which was the former circular. There is little trading at best.

The movement of domestic sizes in the Carterville field of Williamson and Franklin County has almost stopped. Every mine has "no bills" and there seems to be no immediate prospect of moving them. Prices do not seem to be a factor. There just isn't the demand. There has been a let-up in railroad buying. Somewhat similar conditions prevail in the DuQuoin and east Jackson County field, excepting that the prices are far below those of the association operators in the Carterville district. In the Mt. Olive district things are practically at a standstill. A little railroad coal on contract is moving out, but there is no domestic tonnage moving and no steam sizes to offer.

In the Standard field the only demand is for screenings but this is very light. Railroad tonnage has been good in this district, but is easing up.

Nothing Doing in St. Louis

Hot weather has practically put an end to the delivery of coal except a little hard coal, smokeless and coke. A little apartment coal and some school coal is going in, but that is all. Wagonload steam is quiet and carload is notice-

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

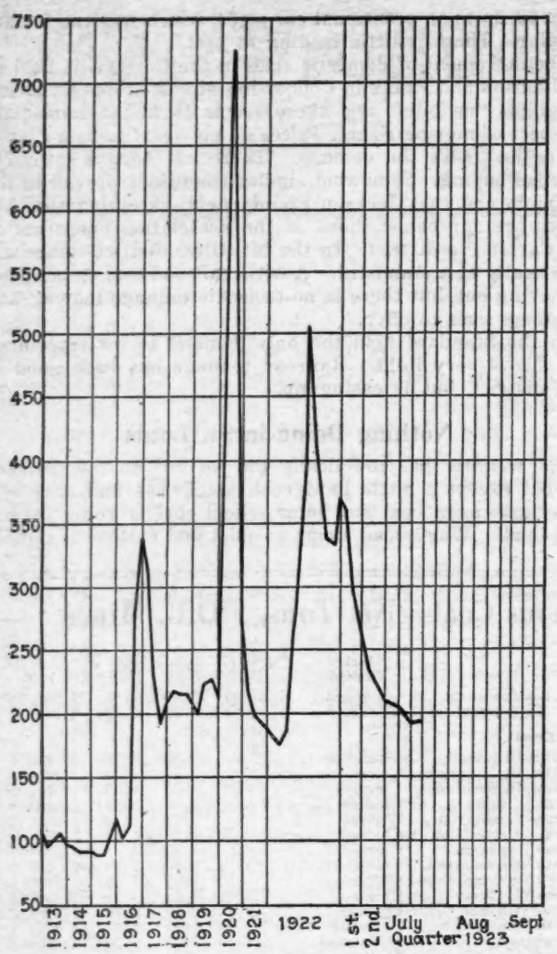
	Market Quoted	July 17 1922	July 2 1923	July 9 1923	July 16 1923†
Low-Volatile, Eastern					
Smokeless lump	Columbus	$3.95	$5.85	$5.85	**$5.75@$6.25**
Smokeless mine run	Columbus	3.75	3.60	3.25	3.00@ 3.50
Smokeless screenings	Columbus	3.45	3.35	3.10	*2.75@ 3.10*
Smokeless lump	Chicago	4.15	6.10	6.10	6.00@ 6.25
Smokeless mine run	Chicago	4.15	3.75	3.60	3.25@ 4.00
Smokeless lump	Cincinnati	4.40	6.25	6.00	6.00
Smokeless mine run	Cincinnati	3.80	3.35	3.60	*3.00@ 3.75*
Smokeless screenings	Cincinnati	3.25	3.00	3.35	*2.50@ 3.50*
*Smokeless mine run	Boston	6.55	5.60	5.35	5.25@ 5.50
Clearfield mine run	Boston	3.40	2.35	2.25	**2.00@ 2.75**
Cambria mine run	Boston	3.85	2.85	2.85	2.50@ 3.25
Somerset mine run	Boston	3.50	2.60	2.50	**2.25@ 3.00**
Pool 9 (Navy Standard)	New York	.....	3.60	3.50	3.25@ 3.75
Pool 1 (Navy Standard)	Philadelphia	.....	3.60	3.55	**3.30@ 3.90**
Pool 1 (Navy Standard)	Baltimore	.....	.....	.....	.....
Pool 9 (Super. Low Vol.)	New York	.....	2.80	2.75	*2.35@ 2.75*
Pool 9 (Super. Low Vol.)	Philadelphia	4.75	2.80	2.70	*2.40@ 3.00*
Pool 9 (Super. Low Vol.)	Baltimore	4.50	2.60	2.60	*2.40@ 2.60*
Pool 10 (H.Gr.Low Vol.)	New York	4.80	2.45	2.35	*2.00@ 2.50*
Pool 10 (H.Gr.Low Vol.)	Philadelphia	4.55	2.20	2.25	2.20@ 2.35
Pool 10 (H.Gr.Low Vol.)	Baltimore	4.50	2.25	2.25	*2.15@ 2.25*
Pool 11 (Low Vol.)	New York	4.60	2.05	1.80	**1.75@ 2.00**
Pool 11 (Low Vol.)	Philadelphia	4.40	1.85	1.85	**1.75@ 2.00**
Pool 11 (Low Vol.)	Baltimore	4.30	2.05	2.05	2.00@ 2.10
High-Volatile, Eastern					
Pool 54-64 (Gas and St.)	New York	4.70	1.80	1.65	**1.60@ 1.95**
Pool 54-64 (Gas and St.)	Philadelphia	4.40	1.60	1.55	**1.40@ 1.80**
Pool 54-64 (Gas and St.)	Baltimore	4.10	1.75	1.75	1.75
Pittsburgh scr'd gas	Pittsburgh	.....	2.80	2.40	**2.60@ 2.75**
Pittsburgh mine run (St.)	Pittsburgh	.....	2.05	1.95	1.90@ 2.00
Pittsburgh slack (Gas)	Pittsburgh	.....	1.50	1.50	*1.30@ 1.50*
Kanawha lump	Columbus	4.00	3.00	3.00	2.75@ 3.25
Kanawha mine run	Columbus	3.65	1.85	1.85	1.75@ 2.00
Kanawha screenings	Columbus	3.40	1.25	1.10	1.00@ 1.20
W. Va. lump	Cincinnati	4.25	3.50	3.25	*3.00@ 3.25*
W. Va. Gas mine run	Cincinnati	4.25	1.85	1.75	**1.50@ 2.25**
W. Va. Steam mine run	Cincinnati	4.00	1.85	1.75	**1.50@ 2.25**
W. Va. screenings	Cincinnati	3.60	1.25	1.05	1.00@ 1.10
Hocking lump	Columbus	3.80	2.75	2.75	2.50@ 3.00
Hocking mine run	Columbus	3.70	1.85	1.85	1.75@ 2.00
Hocking screenings	Columbus	3.40	1.25	1.25	1.20@ 1.30
Pitts. No. 8 lump	Cleveland	4.75	2.55	2.55	*2.05@ 3.00*
Pitts. No. 8 mine run	Cleveland	$4.40	$1.95	$1.90	**$1.90@$2.10**
Pitts. No. 8 screenings	Cleveland	4.40	1.25	1.25	**1.25@ 1.35**
Midwest					
Franklin, Ill. lump	Chicago	.....	3.90	3.90	3.50@ 4.35
Franklin, Ill. mine run	Chicago	.....	3.00	3.00	2.75@ 3.25
Franklin, Ill. screenings	Chicago	.....	1.65	1.65	1.50@ 1.85
Central, Ill. lump	Chicago	.....	2.60	2.60	2.50@ 2.75
Central, Ill. mine run	Chicago	.....	2.10	2.10	2.00@ 2.25
Central, Ill. screenings	Chicago	.....	1.35	1.35	**1.50@ 1.60**
Ind. 4th Vein lump	Chicago	.....	3.35	3.35	3.25@ 3.50
Ind. 4th Vein mine run	Chicago	.....	2.60	2.60	2.50@ 2.75
Ind. 4th Vein screenings	Chicago	.....	1.60	1.60	1.50@ 1.75
Ind. 5th Vein lump	Chicago	.....	2.85	2.85	2.75@ 3.00
Ind. 5th Vein mine run	Chicago	.....	2.10	2.10	2.00@ 2.25
Ind. 5th Vein screenings	Chicago	.....	1.45	1.45	1.40@ 1.50
Standard lump	St. Louis	.....	2.25	2.35	2.25@ 2.50
Standard mine run	St. Louis	.....	1.75	1.85	1.85
Standard screenings	St. Louis	.....	1.20	1.15	**1.15@ 1.25**
West Ky. lump	Louisville	6.15	2.25	2.25	**2.15@ 2.50**
West Ky. mine run	Louisville	6.15	1.75	1.65	**1.50@ 1.90**
West Ky. screenings	Louisville	6.15	1.15	1.15	**1.15@ 1.25**
West Ky. lump	Chicago	6.50	2.40	2.40	2.25@ 2.55
West Ky. mine run	Chicago	6.50	1.15	1.15	1.10@ 1.25
South and Southwest					
Big Seam lump	Birmingham	2.35	3.05	3.25	3.15@ 3.40
Big Seam mine run	Birmingham	2.20	2.05	2.05	*1.75@ 2.15*
Big Seam (washed)	Birmingham	2.40	2.35	2.35	2.25@ 2.50
S. E. Ky. lump	Chicago	4.15	3.25	3.25	*2.75@ 3.00*
S. E. Ky. mine run	Chicago	4.15	2.35	2.35	*2.00@ 2.25*
S. E. Ky. lump	Louisville	4.40	3.25	2.75	**2.75@ 3.00**
S. E. Ky. mine run	Louisville	4.15	2.00	1.85	**1.75@ 2.25**
S. E. Ky. screenings	Louisville	4.25	1.25	1.05	.90@ 1.25
S. E. Ky. lump	Cincinnati	4.25	3.10	3.25	*3.00@ 3.25*
S. E. Ky. mine run	Cincinnati	4.00	1.75	1.60	**1.50@ 2.25**
S. E. Ky. screenings	Cincinnati	3.75	1.00	1.05	*.75@ 1.25*
Kansas lump	Kansas City	5.00	4.00	4.00	3.50@ 4.50
Kansas mine run	Kansas City	4.75	3.25	3.25	3.00@ 3.50
Kansas screenings	Kansas City	4.25	2.60	2.60	2.50@ 2.75

* Gross tons, f.o.b. vessel, Hampton Roads.
† Advances over previous week shown in **heavy type**, declines in *italics*.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	Latest Independent	Pre-Strike Company	July 9, 1923 Independent	July 9, 1923 Company	July 16, 1923† Independent	July 16, 1923† Company
Broken	New York	$2.34	.....	$7.60@$7.75	.....	$7.75@$8.35	.....	$7.75@$8.35
Broken	Philadelphia	2.39	$7.00@$7.50	7.75@ 7.85	.....	7.00@ 8.10	.....	7.00@ 8.10
Egg	New York	2.34	7.60@ 7.75	7.60@ 7.85	$8.50@12.00	8.00@ 8.35	$8.50@12.00	8.00@ 8.35
Egg	Philadelphia	2.39	7.25@ 7.75	7.75	9.25@11.00	8.10@ 8.35	9.25@11.00	8.10@ 8.35
Egg	Chicago*	5.06	7.50	8.25	8.50@12.00	7.25@ 7.45	8.50@12.00	7.25@ 7.45
Stove	New York	2.34	7.90@ 8.20	7.90@ 8.10	8.50@12.00	8.00@ 8.35	8.50@12.00	8.00@ 8.35
Stove	Philadelphia	2.39	7.85@ 8.10	8.05@ 8.25	9.25@11.00	8.15@ 8.35	9.25@11.00	8.15@ 8.35
Stove	Chicago*	5.06	7.75	8.25	8.50@12.00	7.25@ 7.45	8.50@12.00	7.25@ 7.45
Chestnut	New York	2.34	7.90@ 8.20	7 90@ 8.20	8.50@12.00	8.00@ 8.35	8.50@12.00	8.00@ 8.35
Chestnut	Philadelphia	2.39	7.85@ 8.10	8.05@ 8.15	9.25@11.00	8.15@ 8.35	9.25@11.00	8.15@ 8.35
Chestnut	Chicago*	5.06	7.75	8.25	8.50@12.00	7.25@ 7.45	8.50@12.00	7.25@ 7.45
Ranges	New York	2.34	.....	.....	.....	8.30	.....	8.30
Pea	New York	2.22	5.00@ 5.75	5.75@ 6.45	6.75@ 8.00	6.00@ 6.30	6.75@ 8.00	6.00@ 6.30
Pea	Philadelphia	2.14	5.50@ 6.00	6.10@ 6.25	7.00@ 7.50	6.15@ 6.20	7.00@ 7.50	6.15@ 6.20
Pea	Chicago*	4.79	6.00	6.25	7.00@ 8.50	5.30@ 5.65	7.00@ 8.50	5.30@ 5.65
Buckwheat No. 1	New York	2.22	2.75@ 3.00	3.50	2.75@ 3.50	3.50@ 4.15	2.75@ 3.50	3.50@ 4.15
Buckwheat No. 1	Philadelphia	2.14	2.75@ 3.25	3.50	2.75@ 3.50	3.50	2.75@ 3.50	3.50
Rice	New York	2.22	2.00@ 2.50	2.50	1.80@ 2.50	2.50	1.80@ 2.50	2.50
Rice	Philadelphia	2.14	2.00@ 2.50	2.50	1.75@ 2.50	2.50	1.75@ 2.50	2.50
Barley	New York	2.22	1.50@ 1.85	1.50	1.25@ 1.50	1.50	1.25@ 1.50	1.50
Barley	Philadelphia	2.14	1.50@ 1.75	1.50	1.15@ 1.50	1.50	1.15@ 1.50	1.50
Birdseye	New York	2.22	.....	2.00@ 2.50	.....	1.60	.....	1.60

*Net tons, f.o.b. mines †Advances over previous week shown in **heavy type**, declines in *italics*.



Coal Age Index of Spot Prices Bituminous Coal F.O.B. Mines

	1923			1922,
	July 16	July 9	July 2	July 17
Index	198	197	203	321
Weighted average price	$2.40	$2.38	$2.46	$3.89

This diagram shows the relative, not the actual, prices on fourteen coals, representative o f nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913, 1918," published by the Geological Survey and the War Industries Board.

able only occasionally, with a call for screenings. Country domestic business shows a little activity, but it is not general. Country steam has almost dropped off.

Kentucky Ships Some

With all fields open and car supply good, with no strikes or other influences to hold down production or slow up delivery, it must be admitted that there is a lot of coal moving, in spite of the gloomy reports put out by operators and jobbers. Producers are keeping quality up. Both domestic and screenings are moving but mine-run is flat.

The western Kentucky field is moving some coal North and Northwest and into Michigan. Screenings are slightly stiffer than they have been. A better demand is needed in Kentucky and Tennessee, where there appears to be a backward buying feeling. Industrial demand is fair but stocking is light.

Duluth Demand Is Light

Demand for commercial bituminous coal on the Duluth market continues dull with consumers ordering for immediate needs only. Prices are irregular with further cuts being made in screenings in the effort to book business.

Around Minneapolis there is little trading. Both dock and rail agencies are getting ready for one of the sharpest fights of years when demand finally wakes up. Just now the market is so demoralized it is difficult to name a going price on anything.

In Milwaukee the market is fair considering the season. Dock storage is rapidly filling, but there remains plenty of room for more anthracite. Movement inland is slow. Prices remain unchanged.

The strenuous efforts of Kansas City agencies to push coal storage thus far have produced no results. People will not buy. Perhaps the elaborate advertising campaign of the coal producers has not run long enough to show results. In Colorado, however, storage is picking up a bit following Federal Fuel Distributor Wadleigh's "buy-now" advice.

Reaction for Better in Central Ohio

A slight reaction took place in the central Ohio market during the past week and buying is more active. This is due in part to the tendency shown by some of the larger steam users to come into the market. Distress coal is being cleaned up and buyers are taking in coal to meet current requirements. Householders are not coming into the market as it was expected that they would, with the result that retail dealers are heavily stocked. Buying by railroads and utilities is the best feature. Distress coal has been increasing in volume in the Cincinnati market, and it has been difficult to move good coals, even at the low prices quoted. West Virginia 2-in. lump is quoted at $2.50@$2.75, no change from last week, and southeastern Kentucky 2-in. lump at $2.50 as compared with $2.50@$3. The coal trade in and around Cleveland continues dull. Demand for steam coals is at a standstill, the majority of users buying bargain coal as they need it.

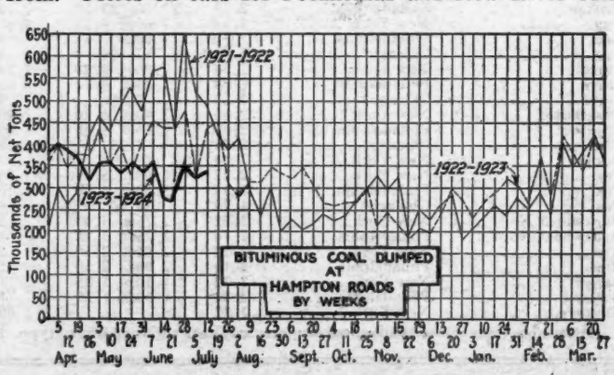
Pittsburgh Steel Mills Curtail Buying

Steel plants in the Pittsburgh district are buying less gas coal, the mills being very conservative in making commitments on any materials, as they are operating at lower rates and may have further declines in operation in the next few weeks. Operators are divided in their opinion of the situation. One batch of operators claim to be doing a good business while another batch say they have given up and are closing their mines, being tired of operating at a loss. The market at Buffalo is flat. Accumulation of coal is large and there are no indications of increased buying in the near future.

Indifference Reigns in New England

The market in New England shows little sign of recovery. Stocks are large as compared with other seasons and buyers are extremely hard to find. There is almost an utter lack of interest on the part of consumers throughout the territory and receipts both all-rail and by water are steadily dwindling. A few market cargoes put in an appearance and it is rumored that some extremely low prices were made to avoid vessel demurrage. Most larger buyers have not been attracted by these, purely because of the large reserves already accumulated, and there seems slight prospect of better inquiry before September.

Coals from the Pennsylvania districts are now less heard from. Prices on cars for Pocahontas and New River rule



so low, relatively, that except in the section west of Worcester there is only a very light tonnage being placed. Even deliveries on contract have been curtailed; the textile mills in particular have had so discouraging a prospect on finished goods that their consumption of fuel is much less than expected. Movement of high volatiles as well as steam coals via Philadelphia and New York for transshipment by water also has fallen off materially. Quotations generally are not any lower, except on distress coal, the operators having apparently in each case fixed upon an irreducible minimum.

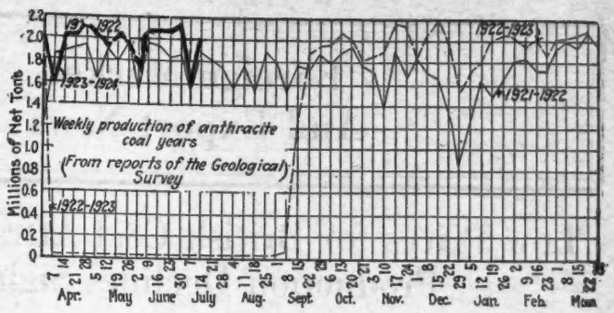
Hampton Roads grades seem to be marking time. Producers of No. 1 navy standard coals have curtailed in the most drastic fashion; to such extent is this true that certain agencies when called upon for spot delivery find themselves in no position to respond.

For delivery inland from Boston, Providence, and Portland prices range from $6.75@$7.25 per gross ton, although the former is more nearly the market level in trade that may be considered at all competitive. A few distributors who felt obliged early in the season to guarantee against a declining market are finding their contractors in a mood to insist upon adjustments in view of insistent soliciting for offers on cargoes either arrived or on passage. Among the market cargoes in process of being forced upon reluctant buyers are those in barges from Philadelphia, where the coal was dumped to avoid heavy car demurrage.

Dullness Pervades Seaboard Market

The market at New York and along the Eastern seaboard is dull with most quotations showing a decline from last week. Distress coal in the New York harbor has been nearly cleaned up, some of it having been let go at extremely low prices. Buyers for the most part are buying from hand to mouth. The bulk of sales in the Philadelphia market are being made at current quotations, with contract coals moving well. Domestic sizes of bituminous coal are being taken in by consumers who have been converted to its use during the last few winters, but this is not a large factor in the trade. Inquiry is increasing in Baltimore, mostly from interests which usually stock up in part or in full during the summer months but who this year have failed to take more than thirty or sixty days' requirements. There is little doing in the Birmingham market. Inquiry is limited and buyers are purchasing for immediate wants only. Orders for bunker coal are scarce. Domestic demand is easy, but the higher grades are moving fairly well. Production for the week ended June 30 was 364,000 tons, an increase over previous weeks.

There were 463,700 tons of anthracite sent out from Buffalo during June, making the Lake dumpings for the season 1,926,729 tons. Bituminous stocks on the docks at Duluth as of July 12 were estimated at 3,185,000 and of anthracite 228,000 tons. At Milwaukee receipts thus far during July have been 65,700 tons of anthracite and 212,559 tons of soft coal, making the total for the present season 357,219 tons of anthracite and 1,307,410 tons of bituminous coal.


Millions of Net Tons
1921-1922
1922-1923
1923-1924
Weekly production of anthracite coal years
(From reports of the Geological Survey)
1922-1923
Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar.

During the week ended July 16 1,012,064 net tons of cargo coal and 58,611 net tons of fuel coal was dumped at Lake Erie ports, making the total dumpings for the season 12,361,332 tons.

Anthracite Consumers Urge Deliveries

Consumers of domestic sizes of anthracite continue to watch developments. Heeding the warnings sent out from Washington, they are urging retail dealers for deliveries. Quotations for independent domestic coals continue as high as $12 in some instances, most of the high-priced coal being taken by inland dealers, while dealers receiving their coal by means of tidewater shipments are not inclined to pay the extremely high prices.

In the New York retail market egg coal is the shortest and some dealers have been able to accumulate small stocks of stove coal. In Philadelphia, as in practically every other district, no retail dealer is willing to admit that he is receiving sufficient coal to meet the demands of his customers. The hard coal situation at Baltimore is far from being comfortable to consumers. Few of the dealers have any stocks on hand and are far behind in deliveries. During June 1,110 cars of anthracite were shipped to Baltimore as compared with 1,455 cars received in May. During the first half of July 264 cars were reported as having been received. Retail dealers in Toronto are kept busy filling orders for anthracite, which has for some time retained its price of $15.50 a ton. Supplies are fairly plentiful. Anthracite is going into Chicago in fair volume but there is no rush for it on the part of the consumer. Some dealers think the movement into cellars is a shade better than in normal summers.

Production of beehive coke during the week ended July 7 is estimated by the Geological Survey as 372,000 net tons, as compared with 399,000 tons during the previous week.

Car Loadings, Surplusages and Shortages

	Cars Loaded All Cars	Cars Loaded Coal Cars
Week ended June 30, 1923	1,021,770	185,757
Previous week	1,002,740	183,350
Same week in 1922	862,845	94,269

	Surplus Cars All Cars	Surplus Cars Coal Cars	Car Shortage	
June 30, 1923	63,636	3,896	.....	.....
Same date in 1922	239,225	147,558	.....	.....
June 22, 1923	58,671	4,269	11,896	7,976

Bituminous Coal Loaded Into Vessels at Lake Erie Ports During Season to End of June*

(In Net Tons)

Ports	Railroads	1923 Cargo	1923 Fuel	1923 Total	1922 Cargo	1922 Fuel	1922 Total	1921 Cargo	1921 Fuel	1921 Total
Toledo	Hocking Valley	1,553,478	45,717	1,599,195	1,179,017	29,241	1,208,258	1,661,310	42,441	1,703,751
	N. Y. C.–Ohio Central Lines	642,792	19,653	662,445	.....	.....	.....	452,256	12,487	464,743
	Baltimore & Ohio	723,174	21,577	744,751	1,433,897	31,949	1,465,846	930,561	26,178	956,739
Sandusky	Pennsylvania	835,312	24,321	859,633	768,563	17,986	786,549	505,505	14,594	520,099
Huron	Wheeling & Lake Erie	504,478	18,071	522,549	7,612	334	7,946	730,318	19,403	749,721
Lorain	Baltimore & Ohio	968,567	58,641	1,027,208	17,820	9,491	27,311	1,192,473	42,729	1,235,202
Cleveland	Pennsylvania	641,445	53,040	694,485	43,358	12,114	55,472	993,390	33,531	1,026,921
	Erie	358,487	15,176	373,663	.....	.....	.....	236,821	7,460	244,281
Fairport	Baltimore & Ohio	224,947	20,860	245,807	.....	.....	.....	.....	.....	.....
Ashtabula	New York Central	1,372,834	79,608	1,452,442	31,083	9,163	40,246	630,706	24,347	655,053
	Pennsylvania	640,104	26,908	667,012	28,342	6,456	34,798	1,238,816	38,013	1,276,829
Conneaut	Bessemer & Lake Erie	958,390	58,164	1,016,554	42,257	743	43,000	412,201	5,887	418,088
Erie	Pennsylvania	207,098	26,551	233,649	28,607	13,789	42,396	476,619	21,642	498,261
Totals		9,631,106	468,287	10,099,393	3,580,556	131,266	3,711,822	9,460,976	288,712	9,749,688

* Compiled by Ore & Coal Exchange, Cleveland, Ohio; H. M. Griggs, manager.

Foreign Market And Export News

Low Prices for British Coal Attract Buyers; Production Declines Sightly

There was a further decline in the output of Great Britain's coal mines, as well as in prices. Production for the week ended June 30 was 5,400,000 tons, says a cable to *Coal Age*, as compared with 5,588,000 tons the previous week, a decrease of 188,000 tons. Quotations on the principal grades for last week show a slight decrease.

The supply of Welsh steam coal is exceeding the demand, while the anthracite industry is strong. European buyers have been attracted by the low prices and the German business has increased. Some substantial orders have been booked for steam coals.

The Newcastle market shows substanial improvement, in spite of the holiday season and the decrease in production. Low prices have resulted in inquiries being received from the Continent and there has been heavy bookings for prompt shipments. The prospects for good business during the next three months have brightened. It is expected that Germany, France and Belgium will be in the market for large tonnages as a result of the Ruhr situation. Present prices hold steadily.

Board of Trade statistics on coal exports for the month of June, compared with the same month last year, are as follows, in tons:

	June	
To—	1923.	1922.
Germany	1,165,000	890,000
France	1,632,000	982,000
Italy	620,000	467,000
Other countries	3,172,000	2,455,000
Totals	6,589,000	4,794,000

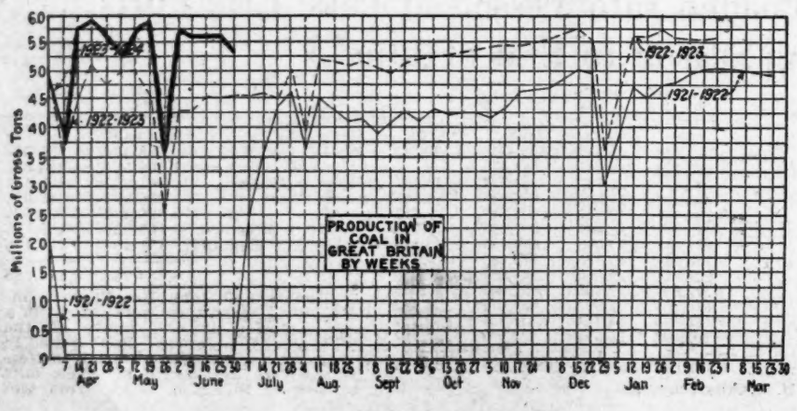
Conditions at Hampton Roads Improve

There was an improvement in business at Hampton Roads last week, prices were stronger and an increase in both inquiries and in actual coal movement was apparent. Movement of coal to Canada was one of the features of the market, while general export business was good. Coastwise trade picked up somewhat.

Bunker business showed some improvement, on the strength of the improvement in general shipping. The tone of the market was firm, and the outlook brighter than at any time in thirty days. The seasonable slump in coal trade appeared to have been mitigated to some extent.

Export Clearances, Week Ended July 14, 1923

	Tons
FROM BALTIMORE	
For Canada:	
Ger. SS. Aladin	4,782
For France:	
Fr. SS. Captaine Boudouin	7,960
Belg. SS. Andalusier	10,297
For Germany:	
Ger. SS. Porto	5,863
For Greece:	
Br. SS. Anselma de Larrinaga	5,909
For Holland:	
Dut. SS. Stadedjk	10,652
Ital. SS. Savoia	8,529
For Italy:	
Ital. SS. Posillipo	8,824
For Uruguay:	
Nor. SS. Henrik Ibsen	5,591
FROM HAMPTON ROADS	
For Algeria:	
Grk. SS. Tsirapinas, for Algiers	6,249
For Brazil:	
Br. SS. Penthew, for Rio de Janeiro	6,200
Braz. SS. Ignassu, for Para	5,096
For Cuba:	
Nor. SS. M. N. Kongshavn, for Havana	3,029
Dan. SS. Stal. for Havana	3,969
Nor. SS. Nordhav, for Havana	3,200
For Canada:	
Amer. Schr. Frances L. Taussig, for Hamilton	1,292
For England:	
Amer. SS. Mundale, for Land's End	4,623
For France:	
Br. SS. W. I. Radcliffe, for Marseilles	8,589
Fr. SS. P. L. M. 24, for Marseilles	8,043
For Holland:	
Du. SS. Zosma, for Rotterdam	11,286
Ital. SS. Corso, for Rotterdam	8,569
For Italy:	
Ital. SS. Zovetto for Porto Ferrajo	6,748
For Uruguay:	
Br. SS. Stokesby, for Montevideo	5,693
For West Indies:	
Dan. SS. Brattensborg, for Curacao	4,285
Nor. SS. John Bakke, for Port au Spain	2,600
Swed. SS. Masila, for Kingston	2,516
Nor. SS. Falkefjell, for Port Antonio	829



Difficult for Germans to Buy British Coal

An indication of the unsatisfactory condition of German finances is manifest in the increasing inability of manufacturers in that country to buy British coal. Shortly after the occupation of the Ruhr, British coal was sent to Germany in such quantities as to encourage the operators in that country to expect a very material addition to their market. German industry, however, has continued to go down grade, which coupled with the adverse exchange has made it increasingly difficult for the Germans to buy British coal. The coal stocks which had been built up in some instances are now being rapidly depleted.

French Coal Production Increasing

Demand for all classes of French coals continues active, but shipments from the Nord and Pas-de-Calais collieries suffer intermittingly because of car shortage.

Receipts of Ruhr coke during the first twenty-five days of June amounted to 136,000 metric tons.

Production of French collieries in May in metric tons was: Coal, 3,129,317 tons; coke, 161,943 tons and patent fuel, 213,471 tons. The production in April was: Coal, 2,999,617 tons, coke, 156,035 tons and patent fuel, 214,342 tons. Of the above tonnages the Nord and Pas-de-Calais collieries produced 1,618,445 tons of coal in May and 1,578,009 tons in April; 104,740 tons of coke in May and 101,317 tons in April, and 110,321 tons of patent fuel in May and 117,143 tons in April.

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	July 5	July 12
Cars on hand	1,347	1,346
Tons on hand	91,724	93,069
Tons dumped for week	82,941	109,522
Tonnage waiting	3,550	.....
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand	1,963	1,917
Tons on hand	109,760	108,120
Tons dumped for week	91,281	108,100
Tonnage waiting	26,400	13,390
C. & O. piers, Newport News:		
Cars on hand	1,752	1,060
Tons on hand	88,645	53,875
Tons dumped for week	123,876	93,208
Tonnage waiting	10,600	9,100

Pier and Bunker Prices, Gross Tons

PIERS	July 7	July 14†
Pool 9, New York	$5.50@$6.00	$5.50@$6.00
Pool 10, New York	5.00@ 5.35	5.00@ 5.35
Pool 11, New York	4.50@ 4.85	4.30@ 5.00
Pool 9, Philadelphia	5.35@ 5.75	*5.30@ 5.75*
Pool 10, Philadelphia	4.45@ 5.25	4.45@ 5.25
Pool 11, Philadelphia	3.70@ 4.35	**3.75@ 4.35**
Pool 1, Hamp. Roads	5.00@ 5.25	**5.75**
Pools 5-6-7, Hamp.Rds.	4.25@ 4.50	**4.85@ 5.00**
Pool 2, Hamp. Roads	5.00	**5.25@ 5.50**
BUNKERS		
Pool 9, New York	5.80@ 6.30	5.80@ 6.30
Pool 10, New York	5.30@ 5.65	5.30@ 5.65
Pool 11, New York	4.80@ 5.15	4.60@ 5.30
Pool 9, Philadelphia	5.75@ 6.00	*5.70@ 6.00*
Pool 10, Philadelphia	4.75@ 5.50	**4.75@ 5.55**
Pool 11, Philadelphia	3.90@ 4.65	3.90@ 4.65
Pool 1, Hamp. Roads	5.00@ 5.25	**5.75**
Pool 2, Hamp. Roads	5.00	**5.25@ 5.50**

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations, by Cable to *Coal Age*

	July 7	July 14†
Admiralty, large	31s.@32s.6d.	*30s.@31s.*
Steam smalls	22s.6d.@25s.	*18s.@22s.6d*
Newcastle:		
Best steams	26s.@27s.	**26s.6d.@27s.**
Best gas	30s.	*28s.@30s.*
Best bunkers	28s @29s.	*26s.@29s.*

† Advances over previous week shown in **heavy type**, declines in *italics*.

News Items From Field and Trade

ALABAMA

The fifth annual field meet for the demonstration of first-aid and mine-rescue work will be held in Woodrow Wilson Park, Birmingham, July 21, under the auspices of the Alabama Mining Bureau and the U. S. Bureau of Mines. A large number of teams from coal mines and industrial plants have entered the contest for the cup and other prizes.

William M. Cook, 55, secretary and treasurer of the Black Creek Coal Co., of Nauvoo, a mining town 70 miles northeast of Birmingham, was **shot and killed** by T. L. Sharp, 65, president of the company, July 7. Cook and Sharp had been partners for many years and owned other mining properties jointly in eastern Kentucky, where they operated under the name of Sharp & Cook.

The State Board of Examiners will hold a session July 23, 24, 25, 26, at Birmingham, to pass on applications for certificates as first and second class mine foremen and fire boss to work in Alabama coal mines. The examination will be held under the direction of Chairman C. H. Nesbitt, chief mine inspector.

COLORADO

The third annual week-end conference on "Human Relations in Industry" will be held on the Y. M. C. A. Conference Grounds at Eastes Park on July 27-29. The sessions will open at 8 o'clock, Friday evening and the closing sessions will be on Sunday afternoon. Among those on the committee are: E. S. Brooks, vice-president and general manager of the Union Pacific Coal Co., Rock Springs, Wyo., Moroni Heiner, vice-president, United States Fuel Co., Salt Lake City, and E. H. Weitzel, vice-president and general manager, the Colorado Fuel & Iron Co., Pueblo.

The Denver & Rio Grande Western spent $7,700,000 in upbuilding the system and service since the receivership under Joseph Young began in July, 1922, and expects to put that much more into the system during 1923, though the receiver has resigned and another operating head is to be chosen. The road has added 10 new Mallet freight locomotives and 700 70-ton coal gondolas. It expects to facilitate car distribution through the Utah mines it serves by installing soon a telephone system out of Soldier Summit.

ILLINOIS

And now comes the **minority report** of the legislative committee which investigated the **Herrin massacre** aftermath to see whether the officials of the state did their duty. Two members of the committee, Representatives Curran and Pierce, find that adjutant General Carlos Black and his aide, Colonel Sam Hunter did all that any two officers could do, failing to get troops to the scene in time to prevent the massacre because nobody could foresee what was going to happen. The two committeemen also absolve Governor Len Small from all responsibility. Representative Pierce was one of the men indicted for jury fixing in the trial of Governor Small for misappropriation of state funds. The majority report condemned all officials for non-performance of duty.

INDIANA

Production of coal at shipping mines in Indiana for the years 1917 to 1922, classified by counties, railroads and beds of coal, is the subject of a statistical report just published by Jonas Waffle, secretary of the Indiana Coal Traffic Bureau, Terre Haute. The report shows that production from the Fifth Vein in each of these years except 1918 represented more than half the state total and that production from the Fourth Vein was more than 30 per cent in each of these six years except 1920. The C. & E. I. RR., is the largest originator of coal in Indiana, with the Milwaukee and the Pennsylvania the next largest roads.

KENTUCKY

The U. S. Engineer's office at Louisville will receive bids until July 23 for furnishing 60 carloads of mine-run f.o.b. Addison.

That the Lake embargoes are playing havoc with coal operators is shown in reports reaching Louisville from the Harlan field, which states that one operator who took a 200-car order recently later received an embargo, and some twenty cars which had been loaded and pulled, had to be set back on his tipple siding.

According to coal men and traffic men of Louisville **the embargo situation on coal moving to Lakes has aided eastern Kentucky operators** steadily since the season opened. Movement has been heavy and bottoms scarce, as some ore boats have been going back empty to save time in transportation of ore, which it is said is more needed than the revenue from transporting coal. Some of the connecting lines have from time to time placed and later lifted embargoes, but congestion has now reached a point where the producing lines are being forced to embargo, as they can't move coal from their own systems to connections. The present embargo on the L. & N. lines may have a marked effect if it lasts any length of time.

MINNESOTA

The hearing by the Federal Trade Commission in St. Paul was suspended for the last few days of June, due to the exhaustion of funds. It was resumed July 2, when the new year's funds became available. The testimony is much of a repetition, with endless letters and circulars issued by the dock association or some of its members, touching upon an agreement or understanding either as to prices or methods of handling public contracts.

A tour of inspection of the Pittsburgh Company's docks at Duluth has been made by John A. Donaldson, vice-president of the company, and the following directors: T. F. Gillespie, E. M. Love, Peter Reiss, George Taylor and W. G. Worden. They were accompanied by W. H. Roehl, of Minneapolis, and J. A. Ferguson, of Duluth. The latter is sales agent. It is expected that the Pittsburgh will soon decide upon and announce a new selling policy. It is claimed that the dock companies here are gaining headway over Illinois coal.

MISSOURI

The Missouri Pacific has discontinued the office of fuel agent at St. Louis but **H. W. Salmon** is retained under the title of fuel purchasing officer.

NEW YORK

The U. S. Shipping Board on July 7 opened bids for furnishing and delivering alongside vessels, New York harbor, 2,000 gross tons classified Pool 9 coal. The prices ranged from $5.38 to $5.97 per gross ton or on a basis of about $2.10 to $2.63 per net f.o.b. mine. The contract was awarded to O. Jackson Meyer, Inc., of Philadelphia, at $5.38 per gross ton alongside, or about $2.10 per net ton f.o.b. mine. Other bidders and prices submitted were: Gauley Coal Mining Co., $5.97; Seiler Coal Co., $5.53; Shawnee Fuel Co., $5.75; W. A. Marshall & Co., $5.76; Steamship Fuel Co., $5.43; W. H. Bradford & Co., $5.67; E. Russell Norton, $5.83; Hartmann Coal Co., $5.60; H. B. W. Haff, $5.80, and Majestic Coal Co., $5.93.

Bids were opened on July 9 by the Board of Education of New York City for furnishing and delivering to school houses in Greater New York 26,500 net tons of broken coal, 3,900 tons egg coal, 2,730 tons stove coal, 4,370 tons pea coal, 66,600 tons No. 1 buckwheat coal and 3,900 tons semi-bituminous coal. The Steamship Fuel Corporation was awarded the contract for furnishing the coal requirements in Manhattan, Bronx and Richmond boroughs at prices ranging from $12.54 to $14.94 for broken coal, $13.19 to $15.24 for egg and stove, $9.74 to $12.94 for pea coal, $6.12 to $6.74 for No. 1 buckwheat and $6.64 to $7.24 for semi-bituminous coal. Three other bidders on the contracts for Manhattan and Bronx submitted prices ranging from $13.20 to $13.79 for broken coal, $13.20 to $15.29 for egg and stove, $10.20 to $11 for pea coal, $7.14 to $7.70 for No. 1 buckwheat and $7.77 to $8.79 for semi-bituminous coal. The Wyoming Valley Coal Co. obtained the following contracts: Brooklyn—Broken and egg sizes, $12.54; stove, $12.94; pea, $9.54; No. 1 buckwheat, $6.08, and soft coal, $6.62. Queens—Broken and egg sizes, $12.74; stove, $13.14; pea coal, $9.74; No. 1 buckwheat $6.28, and soft coal, $6.62. Parental School, Queens—Broken coal, $6.34. For furnishing and delivering coal to the schools buildings at Rockaway Jameson & Bond Co. was awarded the contract at $14.44 for broken, egg and stove sizes and $12 for pea coal.

NORTH DAKOTA

The Northern Lighite Coal Co. has been incorporated in Fargo with a capital stock of $100,000 by Thomas Buchanan, of Fargo, and Clarence O. Stee, of Dazey.

OHIO

E. L. Greever, attorney, of Tazewell, Va., representing southern West Virginia operators, speaking at the monthly luncheon of the Cincinnati Coal Exchange, held July 12 at the Old Colony Club rooms, said that the United Mine Workers were intent upon creating a labor monopoly and that in the end they would be able to dictate where coal should be shipped and what price it should command. He held that the solution to the whole of the coal "problem" was in preventing strikes.

Among problems taken up at a recent meeting in Cincinnati of the heads of the sales and mining departments of the Blue Diamond Coal interests was the development of the company's coal lands in Lee County, Virginia, and the proposition of bringing coal over a mile down the sides of Little Black Mountain. These developments have been under way for the past six months and it is hoped to have the coal moving from there before Sept. 1. The interests of the company now are in Perry and Harlan Counties, Kentucky, and the Jellico district of Tennessee. According to those interested, so much benefit was derived from the sessions that it was concluded to hold them every six months in Cincinnati.

The North-East Coal Co., with a capital of $500, has been incorporated by interests connected with the Pennsylvania-Ohio Power & Light Co., to take over between 8,000 and 10,000 acres of coal lands in Jefferson County, Ohio, along the Ohio River in connection with the Ohio River Edison Co. power development there.

OKLAHOMA

The Buck Creek Coal Mine Co., of Panama, has let a contract to electrify its mine on the Bedwell No. 2 lease and will install pumps, fans and coal cutters.

PENNSYLVANIA

Negotiations for the sale of the Langcliffe mine of the Suffolk Coal Co. at Avoca to the Suffolk-Anthracite Collieries Co. were concluded in Philadelphia July 11. The consideration is said to be in excess of $1,000,000. The new company, headed by J. E. Crasse, Jr., took possession of the property July 12.

Shipments of anthracite during June, 1923, as reported to the Anthracite Bureau of Information, Philadelphia, **amounted to 6,634,787 gross tons**, as compared with 6,564,285 tons during the preceding month of May, an increase of 70,502, or a little more than 1 per cent. Shipments during the month of June this year show an increase over the corresponding month of 1921 of 602,850 tons, of nearly 10 per cent. The average monthly shipments for the first quarter of the current coal year amounted to 6,457,615 tons, an increase over the average for the first quarter of the coal year 1921-22 of 8.9 per cent., and over the same period in 1920-21 of 12.04 per cent. Shipments by originating carriers were as follows:

	June 1923	May 1923
Phila. & Reading.	1,165,468	1,152,026
Lehigh Valley.	1,188,497	1,150,037
Central RR., of N. J.	563,304	538,386
Del., Lack. & Western.	1,009,505	985,035
Delaware & Hudson.	961,703	892,471
Pennsylvania.	556,291	618,096
Erie.	690,172	721,756
N. Y., Ont. & Western.	162,353	159,043
Lehigh & New England.	337,494	347,435
Totals:	6,634,787	6,564,285

Jack Ronkie and John Benelli were injured on July 7 when they were caught in a **delayed explosion** in the mines of the Sunnyside Coal Co., Jessup. Ronkie died in the afternoon. Bennelli, although suffering from severe injuries to his eyes, cuts and bruises of the face, head, arms and

hands is expected to recover. According to information, when the men had prepared the blast the charge failed to go off and they came back to see what was wrong. They had just reached the chamber when the explosion occurred, sending a shower of rocks and coal in all directions.

John C. Brydon, of Somerset, president of the Somerset County Coal Operators' Association, who was recently elected president of the National Coal Association of the United States, was the guest of honor at a reception and banquet at the Somerset Country Club July 3. The affair was attended by prominent coal operators and friends of Mr. Brydon. Talks were given by Judge Francis J. Kooser, of Somerset; Congressmen S. A. Kendall, of Myersdale, and Congressman Rhodes, of Missouri, chairman of the House Mining Committee.

A deal has been closed whereby the Pennsylvania Coal & Coke Corporation has become the owner of a valuable tract of land near Ebensburg, where the corporation will sink a shaft. It is said the company intends laying out a town in the near future. The company owns thousands of acres in the vicinity of the proposed new town, which will be located several miles north of Ebensburg.

The Madeira-Hill Coal Mining Co., plans the sinking of a shaft at Morann, near Houtzdale, to tap the lower coal veins. According to unofficial reports, the project will cost in the neighborhood of half a million dollars. The shaft will be 200 ft. deep and the operation is to be equipped with every known convenience of mining and shipping of coal on a vast scale. One hundred houses are to be erected at Morann to accommodate the miners. According to the plans, double railroad tracks will be laid to the tipples so that two cars may be loaded at the same time. A third track will be used to convey the empty cars to the shaft, the cars to be switched to the loading tracks as needed. The new tracks will connect with the Whiteside branch, the coal thus reaching its destination over the Pennsylvania lines. Another project which the Madeira-Hill company has in mind is the sinking of a second shaft between Houtzdale and Morann, to reach other coal deposits which the company has in that vicinity.

The homes of four miners were dynamited at Pittston July 13, among them that of Alex Campbell, who is a member of the scale committee which is negotiating with the coal operators at Atlantic City. The front portions of the houses were blown out and the occupants tossed from their beds, but no one was hurt. The first blast occurred at the home of Campbell and other blasts followed at the homes of Charles Alba, Michael Dezalvo and Joseph Martinetta. Campbell had returned from Atlantic City in an effort to aid in the adjustment of a strike at No. 6 and No. 9 collieries of the Pennsylvania Coal Co. He is chairman of the General Grievance Committee of the Pennsylvania Coal Co. and the Hillside Coal & Iron Co. and presided at a meeting of strikers July 12. The dynamiting occurred three or four hours after the meeting.

City officials of Philadelphia profiting by past experience, are **laying in next winter's coal supply** at the rate of 150 tons a day, exclusive of another large quantity in carload lots. In 1922 the Municipal Anthracite consumption was 249,800 tons.

John B. Gallagher and Claude Zerbey, of Wilkes-Barre, have been notified of their reappointment as auditors for the United Mine Workers. Their terms have been extended to April 1, 1924. Rinaldo Cappelini, newly elected district president, had declared he would remove all members of the old administration, but it is said that he has no authority over the auditors because of their connection with the international organization.

The Philadelphia & Reading Ry., it has been announced, will spend about $500,000 on the **erection of a large coaling station at Rutherford,** on the Lebanon Valley division. This consists in the erection of a 2,000-ton capacity coaling bin with coal crushing machinery plant. Rutherford is just east of Harrisburg, and at this point locomotives for Philadelphia and other eastern points are recoaled and watered. There is a big freight yard there, and the change includes rearrangements of tracks and construction of deep-water and inspection pits.

The Lehigh & Wilkes-Barre Coal Co. declared a dividend of 8 per cent, payable on June 26. This is the same as was paid in December of last year. During 1921 the company paid two special dividends, one of $75 a share on March 5 and another of $35 a share on Nov. 29.

The following coal companies were incorporated at the State Department recently: **L. J. Pentzler Coal Co., Inc.,** mining, buying, selling and dealing in coal and coal lands, Philadelphia; capital stock, $50,000; treasurer, John T. Dwyer, 871 North 43d street, Philadelphia, who with L. J. Pontzler, Collingswood, N. J., and M. E. Strock, Collingswood, N. J., incorporated the company. **The Star Fuel Co.,** Perryopolis, mining coal and manufacturing coke and other products; capital, $25,000; treasurer, J. W. Flanigan, Perryopolis; incorporators, R. M. Pollock, Perryopolis; John G. Pollock, Star Junction, and Scott Dunham, Star Junction. **Colonial Coal & Coke Co.,** of Pittsburgh; mining, buying, selling and preparing coal for the market; capital, $100,000; incorporators, E. A. Morris, 2032 Wendover street, Pittsburgh, treasurer; R. M. Carpenter and T. B. Humphries, Pittsburgh. **The Sam-Hill Coal Co.,** Euclid, mining, shipping and preparing coal for the market; capital, $5,000; incorporators, Hyman Witten, Tyler, treasurer; A. D. Carpini, Euclid, and Sam Golumbic, Tyler.

The Wills Coal Co. has been organized at Uniontown with a capital of $50,000 by T. J. McLernan, Harold W. Semans and W. Clark McLernan.

During a heavy rain and electrical storm July 4 night the large power house at the John O. Ream mine, near Berlin, was struck by a bolt of lightning and the **building, generators, motors and all electrical equipment in the plant were destroyed by fire,** which followed the crash. The total loss is estimated at about $20,000, which is partly covered by insurance.

The Reading Company, the Reading Railway and the Reading Coal Co. will soon call special **meetings of stockholders to act on the execution of the segregation plan** filed and accepted by the District Court. Under the Pennsylvania law sixty days' notice is required for such meetings, which probably will be held about Oct. 1. Counsel for the companies is drawing up two new mortgages to be executed by the Reading Company and the Reading Coal Co. Under the order of the District Court the new coal company which is to be formed to acquire the Reading Company's interest may ultimately be dissolved and the stock of the Reading Coal Co. distributed pro rata to the stockholders of the new coal company. The order provides that at any time after the general mortgage shall have been satisfied and discharged as against the coal company, or the several liabilities of the coal company on the unexchanged general mortgage bonds shall have been satisfied, the new coal company may distribute the stock of the Reading Coal Co. to its own stockholders and thereupon dissolve.

The Barnes-Quemahoning Coal Co. at Listie was taken over on July 1 at trustees' sale by the Listie-Quemahoning Coal Co., a corporation formed by a group of men including Connellsville and Scottdale residents. The plant has a capacity of 600 to 800 tons of coal daily but is not operating at that strength just now. Those in the new organization are the Joseph R. Stauffer trust estate. J. L. Kendall and J. L. Kendall, Jr., of Pittsburgh; Walter F., John M. and D. Reid Stauffer and F. L. Brown, all of Scottdale; Andrew Keiser, of Philadelphia, and E. T. Norton, of Connellsville.

UTAH

George W. Hahn, of the United States Fuel Co., has been appointed chairman of the entertainment committee for the summer meeting of the Rocky Mountain Coal Mining Institute in Sale Lake City, Aug. 27-29. The Institute delegates expect to spend Aug. 26 in Rock Springs, Wyo., as the guests of the coal companies there.

VIRGINIA

The City of Norfolk has closed a contract with the Chesapeake & Virginia Coal Co., Lynchburg, for from 8,000 to 10,000 tons of Pocahontas and New River steam coal to be delivered during the ensuing year at $3.20 at the mines. This is the only contract reported in two weeks.

WEST VIRGINIA

Coal loadings on the Chesapeake & Ohio Ry. system for the month of June exceeded the loadings for May by 34,025 tons, according to the monthly report, issued July 2 at Huntington. Total loadings for the month were 3,069,300 tons, or 61,386 cars. During May loadings were 3,035,275 tons, or 60,705 cars. The figures for June were slightly below those of June, 1922.

Twenty-nine tracts of coal in the Richland district, north of Wheeling, with a total acreage of 3,354 have been **purchased by the Ohio County Fuel Co.** for $839,000. The purchase, it is reported, was made to supply fuel for the American Gas and Electric company, and West Penn's power plant at Beech Bottom.

Announcement has been made by R. M. Lambie, chief of the State Department of Mines, that the dates for annual examination of candidates for certificates as mine foremen have been fixed as follows: Morgantown, University Building, on July 20; Clarksburg, Tower School Building, Aug. 23; Wheeling, High School building, on Aug. 20. The above are for examinations in northern West Virginia only.

The West Virginia Great Lakes Coal Corporation, which was recently organized with a capital stock of $2,500,000 and which has acquired the interests of the Fairmont-Pittsburgh Coal & Coke Co., plans to establish yards in Erie, Buffalo, Cleveland, Fairmont and other points and to sell coal direct to the consumer through such retail yards. General offices of the company are to be established in the Odd Fellows Building at Fairmont. Officers of this corporation are: J. Edwin Gaskill, president; J. S. Lemasters, vice president; G. J. Brunkman, of Pittsburgh, Pa., treasurer, and H. M. Hill, secretary.

WASHINGTON

The new mine of the Cherry Creek Coal Co., west of Castle Rock, is now producing and its output is reaching Kelso by truck.

Bids are to be received until 10 A. M., July 25, at Fort Mason, San Francisco, or the Seattle Quartermaster, Intermediate Depot, Seattle, **for furnishing and delivering coal required by the army stations on or near the Pacific coast.** The amounts required are 22,534 net tons bituminous nut coal over 2-in. screen, 19,403 net tons run of mine coal, 10,507 net tons bituminous coal, nut over 1¼-in. and through 3-in. screens, and 1,467 cords of wood. All quantities of coal specified will be subject to a 50 per cent increase if the government so desires. Bidders are required to give an analysis of coal upon which prices are submitted, as well as price per net ton f.o.b. mine and price per net ton f.o b. cars at place of destination.

WISCONSIN

William C. Frye, for seven years president of the Chain Belt Co., Milwaukee, has retired from active participation in its affairs and has been **succeeded by C. R. Messinger,** vice-president and general manager since 1917. Mr. Frye is retiring after an active association with the company for 28 years, during which time he occupied practically all the important executive positions in the company. Mr. Messinger, who succeeds Mr. Frye, became associated with the company in 1917 after eight years as general manager of the Sivyer Steel Casting Co. He also is president of the Interstate Drop Forge Co., vice-president of the Sivyer Steel Casting Co., vice-president of the Federal Malleable Co., all of Milwaukee, and a director in the Nugent Steel Castings Co., of Chicago, and the First Wisconsin National Bank of Milwaukee.

WASHINGTON, D. C.

Substantial progress is being made by the railroads in their program to store by Sept. 1, their fuel coal for this winter. **Forty-four railroads, representing 75 per cent of the total mileage of the Class stored 1,821,412 tons of coal during June.** These 44 railroads on July 1 had a total of 6,638,812 tons of coal in storage.

Transfers and promotions of the personnel of the research branch of the Bureau of Mines have been made public by the Department of the Interior as a result of the resignation of Dr. R. B. Moore, former chief chemist, effective July 1. With the **advancement of Dr. S. C. Lind,** formerly superintendent of the rare and precious metals experiment station at Reno, Nev., to the post of Chief Chemist and chief of the division of mineral technology to succeed Dr. Moore, other changes in posts throughout the country were made. During the past year G. St. J. Perrott and S. P. Kinney have conducted an intensive study of the combustibility of coke in blast furnaces. **This work will hereafter be conducted by Mr. Kinney** in connection with the operation of the experimental blast furnace at the North Central Experiment

Station, Minneapolis, and at commercial furnaces in South Chicago, Ill., and Youngstown, Ohio. **John Blizard**, who has had charge of the Bureau's fuel work at its Pittsburgh Station, **has resigned** to accept a position with a commercial concern in New York City, where he will be engaged on the design of super-heaters and heat transfer apparatus. **C. C. Mather**, of Pennsylvania, has been appointed as a mining engineer aid in the minerals and coal-leasing section of the Bureau, at Denver. **John F. Barkley** has been appointed as an assistant fuel engineer and will have charge of the conducting of tests for the fuel efficiency survey.

A total of 1,502,208 tons of coal has been mined from public domain leased by the Department of the Interior since the General Leasing Law went into effect, according to information given out July 12 by the General Land Office. Upon these leases the government has received an average of royalty of 10c. per ton. Most of these leases have been issued on public land in Utah, Colorado, and Wyoming although several other states are represented and they call for a minimum total annual production of 2,895,325 tons of coal and a required investment of $4,012,800 at the end of the three-year period allowed for the full installation of mining machinery. A considerable number of leases have been made for small mines intended to supply local needs only where the production will not exceed 1,000 tons a year. Prospecting permits have been issued for a total of 378,685 acres of public lands.

CANADA

A bill has passed the Dominion House of Commons, permitting the **Calgary & Fernie Ry. to build a line from Calgary to the headwaters of the Elk River.** The construction of this line forms part of an agreement between the Calgary & Fernie Railway Co. and an English syndicate that is taking over the coal mines owned by the company.

The final **report of the committee of the Dominion Senate**, appointed to investigate Canada's coal supply, **suggests the feasibility of a branch line from the Canadian National system into the Peace River region** for the purpose of opening up extensive deposits of anthracite and semi-anthracite that are known to exist in that part of Alberta and British Columbia. The committee further recommends that the Dominion Fuel Board co-operate with the transportation companies with a view to reducing freight rates from the West to Ontario points, thereby increasing the use of Canadian coal in Canada. Some large deposits of anthracite and semi-anthracite have been proved in the Smoky River district of Alberta and high-grade semi-anthracite and bituminous coals have been developed west of Hudson's Hope, in British Columbia. It is assumed that it is these deposits that the committee of the Senate had in view when it made the foregoing recommendations.

The annual employees' picnics are much enjoyed and keenly anticipated events by the coal miners of the Canadian Collieries (D), Ltd., and the Western Fuel Corporation of Canada. The Western Fuel Corporation's employees held their picnic on June 30 at Newcastle Island and the outing of the Canadian Collieries (D), Ltd., will be held July 21.

Coal production in British Columbia fell off materially in the month of May as compared with April, the difference being some 28,242 tons. Vancouver Island collieries are responsible, to a large extent, for the drop, their output in April being 115,628 tons and in May 97,367 tons. In the Nicola-Princeton field the chief producer, Coalmont Collieries, mined about the same tonnage in May as in April and in the Crow's Nest Pass Coal Field there was a slight drop, about 7,415 tons. An improvement for June is certain.

It is announced that boring tests carried on by the Canadian Collieries (D), Ltd., in the **Sable River district** near Nanaimo, Vancouver Island, have demonstrated that the **coal bodies of that region are capable of a production of 3,000 tons a day for 300 years.**

The annual meeting of the Crow's Nest Pass Coal Co., Ltd., elected directors as follows: W. R. Wilson, H. B. McGiverin, W. H. Robinson, E. P. Earle, A. H. McNeill, J. T. Maher, F. F. Edgar, L. C. Gilman, and Dr. G. W. Howland. Officers elected were: President, W. R. Wilson; Vice-Presidents, H. B. McGiverin and W. H. Robinson; Treasurer, A. Klauer; Comptroller, G. H. Hess Jr.; Secretary, J. S. Irvine. The company's net profits from all sources for the year 1922 totalled $213,959, though the directors paid four dividends of 1½ per cent each, making a total of 6 per cent for the year, amounting in all to $372,690. The company spent last year $35,293.80 on improvements and the coal mined totalled 569,339.14 tons as against 774,847 tons in 1921. The coke produced was 46,368 tons as compared to 66,569 tons in 1921.

An important coal property situated on the south shore of Wabamun Lake, northern Alberta, is being developed by the British Canadian Collieries, Ltd. The leased rights obtained from the Canadian government and the Canadian Pacific Ry. include some 2,200 acres. The coal seam shows on the lake front for the length of a mile and its existence has been known for some time. Development has been retarded because it is on the opposite side of the lake from the railway, making the transportation problem serious. The company has obtained a charter for a branch railway eight miles long connecting with the Grand Trunk Pacific. A seam has been demonstrated 24 ft. in thickness throughout. It is estimated that there is 30,000 tons of first-class coal to the acre. On 1,200 acres the coal carries an overburden of from 20 to 28 ft. The average depth is 30 ft. It is the intention to strip this.

The British Empire Steel Corporation reports coal output in June of 514,604 tons as compared with 382,982 tons in June, 1922, and a total production of coal for six months ending June 30 of 2,822,801 gross tons, compared with a production of 1,763,780 tons during the same period last year. This shows an increase in six months of 1,059,021 tons.

The Dominion Government is asking for tenders for bituminous and anthracite coal supplies for various public institutions throughout the country.

MEXICO

It is stated that **the American Smelting & Refining Co. will spend more than $4,000,000** in developing the Rosita coal field near Sabinas, State of Coahuila, Mexico, which it purchased some time ago. Coke ovens will be constructed and other improvements will be made. According to the statements of engineers who have been exploring the coal field there are approximately 100,000,000 tons available for conversion into high-grade coke. The output of the ovens will go to supply the smelters of the company at Monterey, Asarco, Chihuahua and Aguas Calientes.

Association Activities

Virtually all the producing coal companies and selling agencies with offices in Huntington are represented in the newly organized **Huntington Coal Exchange**, which is to be affiliated with the Huntington Chamber of Commerce. The Exchange has been organized with a view to helping the consumer of West Virginia and eastern Kentucky coals solve his problems and to insure closer co-operation between producer and seller. Meetings will be held every Tuesday at noon. One of the first things to be undertaken by the exchange will be to see that Huntington is given wider publicity as "headquarters for quality coal," it being pointed out that within the last few years the city has become an important trading center owing to its proximity to the Logan, Kanawha and northeast Kentucky fields and owing to the large number of producing companies and selling companies having offices there. The exchange elected as its first president I. F. Vass and named as vice-president T. H. Hooper and as secretary-treasurer, J. J. Lewis. The personnel of the various committees is as follows: Transportation and Communication, F. L. Poindexter, G. J. Beidenmiller, H. A. Smith; Trade Rules, Roy Cunningham, Fred Schoew, Walter Neekamp; Membership, M. M. Tyree, S. J. Hyman and Vandyk Clark; Entertainment, H. R. Freeman, G. D. Alexander, Gerald O'Connor; Publicity, O. A. Doob, John A. Kelly and J. Barrett.

About 350 operators from the district attended the **annual meeting of the Central Pennsylvania Coal Producers' Association and the Association of Bituminous Operators of Central Pennsylvania** held on July 11 at Camp While-Away, near Indiana, while there were a number of invited guests, including prominent men from the Pittsburgh district and the Connellsville coke region. Speakers of the day were: Superintendent John J. Johnston of the Tyrone division of the Pennsylvania R.R., Prof. C. R. Anderson of the forestry extension department of State College and Attorney A. M. Liveright of Clearfield. Superintendent Johnston predicted a heavy volume of traffic this fall and winter and invoked the co-operation of the shippers. Forestation of coal lands was presented by Professor Anderson, who spoke of the advisibility of using idle lands in the coal fields to produce timber for commercial use and for mine props. As a result of the discussion application will be made to the Department of Forestry for half a million seedlings. Operators and visitors were guests at a dinner at the club at noon. The following directors were elected for the Central Pennsylvania Coal Producers' association: G. Dawson Coleman, Philadelphia; Rembrandt Peale and Charles A. Owen, New York; J. William Wetter, Philipsburg; James B. Neale, Minersville; S. T. Brown and B. M. Clark, Indiana; James H. Allport, Barnesboro; R. H. Sommerville, Winburne; M. J. Bracken and H. J. Meehan, Johnstown; J. S. Sommerville, Robertsdale; Fred B. Kerr and G. W. Shillingford, Clearfield; J. R. Caseley, Du Bois; C. B. Maxwell, Morrisdale; W. S. Balisdale, Punxsutawney;; Harry Boulton, Clearfield; W. R. Craig, St. Mary's; D. T. Price, Windber, and E. W. Robertson, Du Bois. The Association of Bituminous Operators elected these directors: Messrs Clark, Peale, Caseley, Robertson; H. B. Scott, of Philipsburg; Brown, Wetter, Shillingford, J. S. Sommerville, Thomas F. Kelly of Coalport, William Lamont of Elmora, I. A. Boucher, of Beaverdale, and Boulton and Bracken. Officers of both boards will be elected at a later meeting.

Obituary

F. W. Walker, formerly a coal retailer of Xenia, Ohio, during the past four years a traveling salesman for the Columbus office of the Elk River Coal & Lumber Co., died at St. Vincent's Hospital, Indianapolis, recently following an operation.

Hugh Moren aged 74, a director of the Duquesne National Bank, the Pittsburgh Steel Foundry Co., the Consolidated Ice Co. and a pioneer in river and coal development in the Pittsburgh district, died July 10 at his home, following an illness of several weeks. Mr. Moren was born at Freemans Landing, W. Va. His first business enterprise was the founding in 1881, with his brothers, of the Advance Coal Company. They sold the company in 1899 to the Monongahela River Consolidated Coal & Coke Co., with which concern Mr. Moren became master of transportation, in charge of a fleet of steamboats operated by the company. Mr. Moren leaves two brothers, Thomas Moren and James Moren.

Herbert M. Matthews, coal traffic manager of the Baltimore & Ohio RR., for the past eight years, died Tuesday, July 10, of pneumonia at his country residence on the Bush River, near Aberdeen, Md. Mr. Matthews was born Oct. 11, 1860, at South Bend, Ind. He entered railway service Nov. 21, 1881, as clerk in the general freight office of the Chicago, Burlington & Quincy RR., at Chicago, being promoted to general agent of that company at Pittsburgh, Oct. 15, 1886, where in April 1897, he first became identified with the Baltimore & Ohio as commercial freight agent. Six months later Mr. Matthews was advanced to division freight agent and on Feb. 1, 1904, in addition was made coal and coke agent at Pittsburgh. Mr. Matthews first went to Baltimore in July, 1905, when the Baltimore & Ohio made him general coal and coke agent, and in July, 1915, he became coal traffic manager of the system. During Federal control of the railroad he was a member of the committee in charge of coal and coke traffic in Trunk Line and New England territory and when the committees were reorganized after the return of the roads to private ownership and management, March 1, 1920, Mr. Matthews was for a year chairman of the Coal and Coke Committee, Trunk Line territory, and a member of that committee until his death. The funeral will be from the residence of his brother-in-law, R. C. Crawford, 210 Hutchinson Avenue, Edgewood, near Pittsburgh. Mr. Matthews was unmarried.

Recent Patents

Detachable Bit for Coal Augers. F. McLaughlin, Canton, Ill.; 1,445,097. Feb. 13, 1923. Filed July 5, 1922; serial No. 572,890.

Power Shovel. E. J. Armstrong, Erie, Pa., assignor to the Ball Engine Co., Erie, Pa.; 1,447,382. March 6, 1923. Original application filed Oct. 30, 1919; serial No. 334,515. Divided and this application filed Oct. 24, 1921; serial No. 505,946.

Automatic Rotary Dump. Erskine Ramsay, Birmingham, Ala.; 1,447,428. March 6, 1923. Filed Oct. 31, 1921; serial No. 511,656.

Mine Car. Samuel A. Worcester, James L. Bruce and Leroy S. Farnham, Butte, Mont.; 1,448,103. March 13, 1923. Filed May 15, 1922; serial No. 561,003.

Car-Hauling Mechanism. Merritt Hutton, St. Benedict, Pa., assignor to Rembrandt Peale, New York, N. Y.; 1,448,119. March 13, 1923. Original application filed Aug. 24, 1920; serial No. 405,699. Divided and this application filed Sept. 24, 1921; serial No. 502,879.

Apparatus for Burning Pulverized Fuel. Charles P. Crawford, Salt Lake City, Utah; 1,448,390. March 13, 1923. Filed Aug. 25, 1919; serial No. 319,531.

Coal Jig. M. P. Lewellen and H. S. Arnold, Camden, N. J.; 1,448,668. March 13, 1923. Filed Oct. 10, 1921; serial No. 506,921.

Coal-Elevating and Conveying Apparatus. Roderick MacEachen, Washington, D. C.; 1,448,756. March 20, 1923. Filed Dec. 18, 1920; serial No. 431,708.

Coal-Loading Machine. Patrick H. Burnell, Rock Springs, Wyo.; 1,448,088. March 20, 1923. Filed May 23, 1921; serial No. 471,748.

Apparatus for Producing, Separating and Feeding Powdered Coal. Ernst H. Elzemeyer and Paul S. Knittel, St. Louis, Mo.; 1,449,169. March 20, 1923. Filed Aug. 1, 1921; serial No. 488,900.

Miner's Cap and Lamp Connection. Charles H. Meister, Bellaire, Ohio; 1,449,867. March 27, 1923. Filed Feb. 16, 1922; serial No. 537,091.

Traffic News

Loading of coal by the Lehigh Valley RR., in June last amounted to 1,224,068 tons of anthracite, the largest total in fifteen months. Last year loadings were very small because of the miners' strike, while in 1921 the tonnage was 1,098,786. **The Lackawanna R.R.** reported anthracite loadings in June of 911,687 tons.

The New York Central R.R. Co. has been authorized by the Interstate Commerce Commission to issue not exceeding $100,000,000 of capital stock in exchange for a like amount of its outstanding 20 year 6 per cent convertible gold debenture bonds.

Rates on soft coal from Manitowoc and other Lake Michigan points to Minneapolis and St. Paul were found not unreasonable or unlawful by the I. C. C. in dismissing the case of the Northwestern Traffic Service Bureau, Inc., against the Central Wisconsin Ry.

The Interstate Commerce Commission in a tentative decision in the case of the Lincoln Gas Coal Co. and others vs. the Baltimore & Ohio RR., and others, held rates on bituminous coal to be reasonable from mines near Washington and Vienna, Pa., to Eastern destinations.

In a tentative report submitted to the Interstate Commerce Commission July 12. Examiner J. F. Eshelmann recommends that the commission find that the rates on bituminous coal, in carloads, from mines in southwestern Pennsylvania to West Virginia destinations are unreasonable. A new scale of rates is prescribed by the examiner.

During June, **2,727,737 net tons of bituminous coal and 296,138 net tons of anthracite passed through the canals at Sault Ste. Marie.** Of this tonnage 2,705,037 tons of soft coal passed through the United States canal and 22,700 tons through the Canadian canal. All of the anthracite tonnage passed through the United States canal.

The Erie R.R. Co. has ordered new equipment to cost $6,500,000. Contracts also have been awarded, it was said, for the reconstruction of 4,459 box cars, 1,000 gondolas and 100 refrigerator cars. Part of the equipment will be delivered and all the cars will be rebuilt in time to handle the heavy freight shipments expected for this fall.

The Coal and Coke Committee, Trunk Line Territory, announces hearings at 143 Liberty St., New York City, beginning at 10:15 a. m., July 24, and continuing July 25, relative to adjustment of rates on anthracite, bituminous coal and coke from mines to numerous points on the D. & H., Central Vermont Ry., B. & A., B. & M., C. N. E. Ry., Rutland Ry., P. & L. E. R.R., N. Y. S. & W. R.R., B. R. & P., Erie, N. Y. O. & W., B. & O., Pennsylvania and other lines, as well as to consider revision of rules and charges covering weighing and reweighing of cars containing coal and coke.

Railroads of the United States on July 1 had 190,411, or 8.4 per cent of the freight cars on line, **in need of repair.** This is the smallest number in need of repair since December, 1920. The total on July 1 was a reduction of 10,373 cars compared with the number of freight cars in need of repair on June 15, at which time there were 200,784, or 8.9 per cent. Under the program unanimously adopted by the carriers in New York last April, the number of such cars are to be reduced to 5 per cent by Oct. 1 next.

When the Morgantown & Wheeling RR. was sold at Morgantown under a decree of the Circuit Court of Monongalia County the Monongahela Ry. became the purchaser although the property was bid in by the newly organized Scott's Run Ry., which is a holding company. The bid of the purchaser was $521,929.91 but there are other obligations to be assumed which will bring the total up to about $1,000,000. There has been such rapid coal development on the Morgantown & Wheeling in the last six or seven years that the property, serving as it does the Scott's Run field, has become extremely valuable, especially as a feeder of the Monongahela Ry., with which it connects at Maidsville. More than 7,300 cars of coal were loaded on the M. & W. in June. Colonel H. C. Nutt, president of the Monogahela Ry., says that extensive improvements will be made and that the purchasing company will make provision for a much better system of operation. Among other things the remaining leg of the "Y" at the mouth of Scott's Run will be constructed, so that more traffic can be handled.

Alleging that the present **rates on bituminous coal from the Pittsburgh district of Pennsylvania to ports on Lake Erie are unjust** and unreasonable as compared with the rates from mines in other districts in Pennsylvania, Ohio, Maryland, West Virginia, Virginia, Kentucky and Tennessee to the same points, the Pittsburgh Coal Producers' Association and approximately thirty other coal operators in the Pittsburgh district filed a formal complaint with the Interstate Commerce Commission asking for the establishment of lower rates. The complaint states that the operators in the Pittsburgh district produce upward of 25,000,000 tons of bituminous coal yearly. In brief it alleges that the rates from the Pittsburgh district to the Ports of Erie, Erie docks, Conneaut Harbor, Ashtabula Harbor, Fairport Harbor, Cleveland, Cleveland pier, Lorain, Huron, Sandusky and Sandusky dock are "intrinsically unjust and unreasonable in that they are unreasonably high and are likewise unjust as compared with the rates from mines in competiting districts."

The net railway operating income of the Class 1 railroads of the United States in May amounted to $89,999,600, which represented a return on an annual basis of 6.33 per cent on their tentative valuation. The net operating income for the carriers in the Eastern district was at the annual rate of return of 7.72 per cent; the Southern district, 6.72 per cent, and the Western district, 4.43 per cent. The same carriers in May last year had a net operating income of $62,069,000 or 4.46 per cent. In April this year it was $83,197,800 or 6$\frac{1}{2}$ per cent. Operating revenues of the carriers in May totaled $547,282,500, an increase of 21.8 per cent over the same month last year, while their operating expenses amounted to $420,656,000, or an increase of 18.4 per cent over May last year.

The increase in earnings over May last year was largely due to a stimulation in freight traffic which, according to incomplete reports, was the greatest, measured in net ton miles, for any May in the history of the railroads, amounting approximately to 39,000,000,000 net-ton miles. This was not only an increase of more than 42 per cent. over May last year but was an increase of more than 3 per cent over May, 1917, which had marked the previous record for that month. Freight traffic in May this year not only exceeded the preceding month, but was the heaviest for any month so far this year. Class 1 railroads during the first five months this year had a net operating income of $356,966,900, which would be at the annual rate of return of 5.69 per cent, compared with $273,215,000 or 4.45 per cent, during the corresponding period last year. Operating revenues for the five months' period totaled $2,553,856,600, an increase of 19.4 per cent over the same period last year, while operating expenses totaled $2,026,163,600, or an increase of 18.2 per cent.

Coal mines owned and operated by the Chesapeake & Ohio Ry., should not come within the scope of the assigned-car decision, in the opinion of W. S. Bronson, the general attorney of the railroad, in a petition filed July 12 with the Interstate Commerce Commission. These railroad mines "manned by its own employees, digging its own coal," Mr. Bronson contends, "could not by any stretch of imagination be held to be commercial mines. These mines never ship coal in commerce. All the coal mined merely is moved by the railway company in its own cars for its own private purposes, a necessary function to the operation of its railroad." Continuing, Mr. Bronson concludes "that the assigned-car decision does not apply to mines which do not ship coal," and that company mines "are not subject to the decision and the order in this proceeding. Any other interpretation necessarily must be based upon the finding that the C. & O. mines are commercial mines—an absurdity." The opinion is expressed in traffic circles that Mr. Bronson, in filing such a contention, has overlooked the decision of the U. S. Supreme Court in the case of the Interstate Commerce Commission versus the Illinois Central, in which any such doctrine is characterized as being unsound. "It may not be doubted," says the Supreme Court's opinion, "that the equipment of the railroad company engaged in interstate commerce, included in which are its coal cars, are instruments of such commerce."

Coming Meetings

The tenth annual **Tennessee First-Aid Contest and Miners' Field Day** will be held at Knoxville, Tenn., Aug. 4, in the Knox County Court Yard, under the auspices of the Tennessee coal operators, state mine inspectors and the U. S. Bureau of Mines, R. E. Howe, secretary of the Southern Appalachian Coal Operators Association, secretary-treasurer. J. M. Webb, of the U. S. Bureau of Mines, is instructing the first-aid teams.

The American Institute of Mining and Metallurgical Engineers will hold its annual meeting in Canada. The meeting will start Aug. 20 at Toronto and end Aug. 30 at Montreal. Secretary F. F. Sharpless, 29 West 39th Street, New York City.

Rocky Mountain Coal Mining Institute will hold its summer meeting Aug. 27 to 29 at Salt Lake City, Utah, in conjunction with the **International Safety and First-Aid Meet.** Secretary, Benedict Shubart, Denver, Colo.

New York State Coal Merchants' Association will hold its annual convention on Sept. 10-12 at Sacandaga Park, N. Y. Executive secretary, G. W. F. Woodside, 250 Arkay Building, Albany, N. Y.

Oklahoma Coal Operators' Association will hold its annual meeting Sept. 13 at McAlester, Okla. Secretary, A. C. Casey, McAlester, Okla.

The American Mining Congress will hold its twenty-sixth annual convention in conjunction with the **National Exposition of Mines and Mining Equipment,** Sept. 24-29, at the Milwaukee Auditorium, Milwaukee, Wis. Secretary, J. F. Callbreath, Washington, D. C.

National Safety Council will hold its twelfth annual safety convention at the Buffalo Statler Hotel, Buffalo, N. Y., Oct. 1-5. Managing director and secretary, W. H. Cameron, 168 No. Michigan Ave., Chicago, Ill.

The West Virginia-Kentucky Association of Mine, Mechanical and Electrical Engineers will hold its annual meeting Oct. 19-20 at Huntington, W. Va. Secretary-treasurer, Herbert Smith, Robson-Prichard Bldg., Huntington, W. Va.

Coal Mining Institute of America will hold its annual meeting Dec. 19, 20 and 21 at Pittsburgh, Pa. Secretary, H. D. Mason, Jr., Chamber of Commerce Building, Pittsburgh, Pa.